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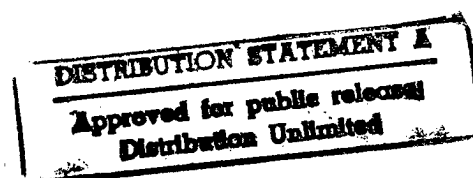
JPRS Report

Science & Technology

***USSR: Science &
Technology Policy***

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Science & Technology

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**Leningrad Obkom Chief Interviewed on Science,
Economic Reforms**

*18140320 Moscow POISK in Russian
No 15, 1 Aug 89 p 4*

[Interview with Corresponding Member of the USSR Academy of Sciences Boris Veniaminovich Gidasov, USSR People's Deputy and first secretary of the Leningrad Party Obkom, by POISK correspondent Arkadiy Sosnov, under the rubric "The First Interview" (Leningrad): "A Horizontal Breakthrough"; date not given; first paragraph is POISK introduction; passages in boldface as published]

[Text] USSR People's Deputy, Corresponding Member of the USSR Academy of Sciences, and First Secretary of the Leningrad Party Obkom Boris Gidasov reflects on restructuring in science, in the economy, and in the party.

POISK: Boris Veniaminovich! As far as I know, although it was the morning following election to your present post, on the way to work to Smolnyy you dropped in at the State Institute of Applied Chemistry. It would be interesting to find out why: to give last instructions or to say a last "goodbye"?

B. V. Gidasov: Neither. I do not intend to give up the search for new forms of the organization of the economy. The establishment of interbranch state associations (MGO's), or so-called concerns, is also one of them. Of course, I will no longer be able, as before, to deal with the settlement of day-to-day questions. But as for the development of the concept of interbranch state associations, the strengthening of horizontal relations among enterprises, and the development of interaction with the system of planning, investments, and material and technical supply—in this I will try to participate without fail, understanding that **without party support progress toward a new economy will be slower and more difficult.** So that "goodbye" was not said.

POISK: It would be worthwhile to talk a little precisely about the concept of interbranch state associations. In my opinion, in its development it is passing through the stages that are typical of any scientific idea. First "this cannot be," then "there is something to this," and finally "who does not know this?"

The idea that an enterprise or group of enterprises would not obey anyone or anything except the law, seemed seditious 2-3 years ago. And much civic courage was required to voice it, and especially to defend it. It was believed that the vertical management system is the best, we simply did not deserve a different one. The idea of a consortium of enterprises could not have originated in the midst of the apparatus, because it deprives the apparatus of power over enterprises. But why did precisely you become its zealous supporter? After all, I believe, the State Institute of Applied Chemistry was not in very bad repute in the ministry, was it?

B. V. Gidasov: By no means. This was a very privileged organization. It had (and today has) great resources and a powerful scientific and technical potential. It was impossible to complain of a lack of attention to it of both Leningrad and central organs, including the USSR Council of Ministers. But that is not the point!

Life itself, rather the urgent reorganization of the economy, particularly the adoption of the Law on the State Enterprise, prompted the organizers of the concern—they were the directors of large chemical and machine building enterprises—to seek new forms of integration. Concerns are the emancipation of enterprises, their release from ministerial fetters, and the possibility of the cooperation of ideas and assets. All this is correct. However, the popular opinion exists that we strove to break away from the tutelage of ministries in order to find an easy life. In reality, on the contrary, our life was complicated by the necessity to be concerned about ourselves—about orders, about sales markets.... And, however paradoxical it sounds, we attempted in our own way to make life easier for ministries.

Let us begin with the fact that ministries in one way or another are being consolidated. Here their size is being reduced and their functions are changing. They cannot but change, inasmuch as direct ties among enterprises are being developed and the market is becoming stronger—this process is taking place extremely painfully, but it is inevitable. But this being the case, ministries are faced with a dilemma: either they will lose control over the situation in the sector, inasmuch as they have thousands of enterprises, or they will agree to the aggregation of enterprises into such complexes, which will make it possible to decrease the number of management units. Including outside the ministries! The main thing, which we tried to attain from the very start, is that within this complex every enterprise taken separately would not lose its independence: either *de jure* or *de facto*.

POISK: You succeeded in this. One of the enterprises belonging to Tekhnokhim changed over to leasing; others concluded tens of contracts within the concerns and with the outside world, bypassing ministries....

B. V. Gidasov: These are also horizontal relations! And a second, just a serious dilemma faced planning organs. It is no secret that the sectorial system of planning through ministries has compromised itself considerably. And in the immediate future it will probably be changed radically. Planning organs need to seek new opportunities, and it will be easier for them, undoubtedly, to interact with concerns which have turnovers in the billions of rubles.

Finally, the bureau of the Council of Ministers for the wood chemical and machine building complex will be able to regulate more efficiently the relations of interbranch state associations with ministries and to keep track of the formulation of no longer sectorial, but precisely state programs.

Now if we tally the preliminary results of the activity of the concerns, the first—and encouraging—result is the fact that the group of enterprises, which left ministries, showed during the year the highest indicators as compared with any enterprise that remained in the former structure. **We proved that we are entirely capable of doing without ministries**—and this is with a minimum (11-man) management staff of the concern. You will agree, to start with this is rather good.

POISK: I would also like to evaluate the quality of the changes. For example, what qualities is science, which has been freed from departmental dictation, acquiring? The example of the young scientists of the State Institute of Applied Chemistry, who addressed to the board of directors the request to farm out to them promising themes (a kind of scientific leasing!), suggests the idea that first of all this increased independence is desirable for any self-respecting scientist and scientific collective.

B. V. Gidasov: You are correct, structural changes are for us not an end in themselves, but merely a means to achieve the maximum production efficiency. And here one of the obstacles is the departmental division itself of science, which does not make it possible to combine efforts for the solution of major, nonstandard problems. Try to solve them today if they had divided our chemistry all but into 12 types of science and 5 ministries!

That is why a number of large-scale scientific and technical programs without a single departmental barrier were developed in Tekhnokhim. For example, petroleum refiners now will not be confined to the output of primary products, as was the case yesterday, but will continue their conversion to detergents. Or plastics. That is, three or four ministries will begin to move over the "territory." Another example: the Fosforit Enterprise, which is narrowly specialized in the production of mineral fertilizers, with the help of partners in the concern will design and build a works for materials for electronics.

The competition among Tekhnokhim, Energomash, and the enterprises, which remained under the jurisdiction of ministries, has already become a reality—for state orders, for finances, for a sales market. And this is splendid, it was worth making a fuss just for the sake of this. Our economy is very short on competition and rivalry. But the concerns have another important mission—the filling of the gaps which inevitably appear when such large organizations as ministries "steer" the economy. For example, the same Fosforit belonged to the Ministry of Mineral Fertilizer Production. And the ministry was by no means worried that an enormous quantity of most valuable fluoride raw material disappears during the production of fertilizers. The filling of such interbranch niches is also a function of the state association and will save it for certain from "unemployment."

This is advantageous for scientists, the enterprise, and the country. It is very important that this practice is

based on world experience of diversification (the investment of assets in various scientific directions). In the West there are hardly any firms that are not diversified, they deal with literally everything, from the construction of hotels to the launching of rockets, and that is why they are unsinkable. Diversification on the broadest scale is what creates stability for the enterprise. Tekhnokhim was also established on these principles.

POISK: Hence, the possibility of financing science in its own interests, which is very unusually for sectorial science, is being proposed. At the State Institute of Applied Chemistry they told me about the risk fund, from which the financing of enterprising developments, which are not connected with specific orders, comes. Then in 2-3 years, having come to a plant, scientists will be able to offer production workers technologies, about which the latter have not dreamt. How are such funds formed, from what sources?

B. V. Gidasov: I will explain. The combining of the efforts of enterprises and the suspension of payments to the centralized funds of ministries enabled us at our own commercial bank (its establishment was also the first experience for the country) to form considerable accumulations, which are spent through several channels.

The first channel is the one you mentioned, this is the financing of risky programs with a result that is not guaranteed. This second is the assets that are used for the development of enterprises (in one place we decide to build an additional shop, in another place a pilot works). Social programs are financed through the third one. We are constructing a house-building combine, are designing another one....

POISK: I heard about this at the Plastpolimer Association, moreover, with curious details. The association turned over 800,000 rubles to the Leningrad City Soviet Executive Committee for housing construction, but thus far they have not been assimilated. Another matter is its own house-building combine, which has been furnished with foreign equipment. Apparently, cooperation within a concern is also advantageous for this; not all enterprises have currency, but if it is pooled....

B. V. Gidasov: We are not ruling out the assistance of foreign firms in housing construction. But for the present it is not clear what the situation will be with currency in the country over the next few years. It will probably be difficult. Therefore, we also provided for other versions. And here the emphasis is on diversification.

POISK: You spoke about how the concern is violating the boundaries of ministerial spheres of influence, which seemed secure, and is entering into competitive battles with monopoly producers. But how democratically is science developing in the concern itself, has a mechanism, which stimulates "internal" rivalry and competition, been found?

B. V. Gidasov: I confess, such a special mechanism does not yet exist. But it can be incorporated and, so it seems

to me, quite easily. It is sufficient to finance several collectives, which are concerned with the same problem, and then to select the best solution.

I was never afraid of what they call parallelism and duplication in science. One should fear duplication when performing planning and surveying work and especially when building facilities of industry. It is well known that in the area of chemistry and chemical technology scientific development proper requires 3-5 percent of the total expenditures on the setting up of final production and the output of products, 5-7 percent are used for pilot operations, 1-2 percent are used for designing. Hence it is clear that the competition of scientific developments is entirely justified, it is more costly for oneself to economize on this stage.

If we look at **how the scientist at the concern feels** (and at Tekhnokhim 40 percent of the staff are representatives of the sphere of science and scientific service), it will turn out that the atmosphere is creative, **it is easy for him to breathe**. For his interests, as a rule, do not fit in the sectorial framework. They are much broader. And whereas previously he had to camp on the doorsteps of administrations of science and technology and be a petitioner at ministries, at the concern he finds everything necessary—the possibilities of the financing of his own programs, a pilot base for the conducting of tests, and a base for introduction. Moreover, we are closely interacting with the Academy of Sciences and higher educational institutions. Therefore, from the “parochial view” of the researcher such a form of the integration of industry and science looks very attractive. At the same time the opportunity is appearing here to aim science at the solution of the most important problems. For example, environmental protection.

I do not know whether I will succeed, but I hope to retain the management of ecological programs, having taken Leningrad themes as the basis. Leningrad on this level is a splendid, although very complex and extremely neglected model. But if we find the correct approaches, they will be suitable for the entire country. And in Tekhnokhim and Energomash I see my support. Because the concern is not only basic research, but also design development and the making of equipment for local purification systems at industrial enterprises of Leningrad and the oblast. Our ecological engineering center will operate on the broadest spectrum: from the generation of ideas to the complete elimination of waste products. For Leningrad this is of enormous social and political importance. **While the possibility of the harmonious combination of scientific and political work inspires me.**

POISK: Thus, the concern strengthens relations horizontally. You, Boris Veniaminovich, took a vertical step, of which, of course, your associates at the enterprises of the interbranch state association are glad. They are confident that in this position you will support them, although you will not be an intercessor at instances and a go-getter. They are counting first of all on ideological

support. But you will consider in what party influence in science, the economy...should consist. What do you yourself think—ought concerns be planted like corn?

B. V. Gidasov: If you talk about corn, I am only for the square-cluster method, moreover, on limited areas.... If you talk about concerns, today it is necessary to have no more than 10-15 of them in the country. And even though, I know, about 400 proposals in this regard are in the Council of Ministers, it is necessary to take a very sober view of them, without moving too fast. At least another year will be needed to polish the standardized documents, to interpret the gained experience, to eliminate everything that has not justified itself, and not to lose anything valuable. To develop many systems and, of course, first of all a system of the interaction of the interbranch state association with the real economic mechanism. In particular, it is necessary to organize the material and technical supply of the concern and to establish a cost accounting subdivision, which will deal with the supply of the interbranch state association with respect to the entire product range, that is, will represent the interests of concerns in the State Committee for Material and Technical Supply. It is necessary that central economic organs would also participate more actively in the strengthening and study of the new structural unit, which the interbranch state association is. This is not only a Leningrad experiment—it is all-union one. I intend in precisely this way to pose the question “vertically.”

Now let us move on. What can a party worker do for the formation of some idea, concept, scientific direction? Let us face it, **we are constantly faced with the resistance of the apparatus, which is loyal to the old methods.** I have in mind both the management apparatus and the ossified part of the party apparatus. At the stage of the formation of new economic structures the stand of the active party worker can become decisive. I know that Tekhnokhim simply would have failed, had it not been for the support of the party Central Committee and the Leningrad Oblast Party Committee. How many times they gathered at this table in the office of the first secretary of the obkom. But for party support, we would not have broken through this wall of indifference. You would not call it even a wall—it is a pillow. If you hit it with all your might, your arm goes in up to your elbow. You pull out your fist, and the form is restored. And everyone says: “yes,” “yes,” “yes.” And everyone is “for.” No one is opposed, but...nothing happens.

Only one thing remains: to mobilize the party forces of the enterprises and organizations, which are a part of the concern, to help them to realize their potentials, to concentrate this here collective thought, and to advance it as far as is necessary for the accomplishment of the task. In this I see the role of the party committee and my own role as first secretary.

POISK: It is noteworthy when the party leader and the scientific collective are allies. But, alas, how many cases there still are of administration by mere decree in

science, and often party administration by mere decree. You have yourself probably also been faced with this....

B. V. Gidasov: My example is hardly indicative. The job itself demanded independence from me. I will say frankly: party organs never particularly hindered me. They helped far more often.

But not for everyone does it turn out that successfully, this is a fact.... I will note that if relations of the scientific collective and the party organ do not take shape, we are inclined to blame the party committee: of course, it is allowing administration by mere decree. But you will not get far in science with a directive. But this is just one side of the coin. There is another one. Organizations, which operate unstably, pursue immediate successes, but then for 7-10 years do not yield a return, very quickly lose prestige in party organs. They send commissions to such an institute and rake the associates over the coals. People are harassed. They begin to feel nervous and to write complaints to the party apparatus. Quite right, they nagged them to death. Are they, perhaps, to blame only for this?

POISK: Nevertheless, Leningrad scientists and party personnel have fine examples of collective creativity to their credit. It is possible to group with them the conducting of economic experiments, such as the "designer-process engineer," which became a step toward the changeover of scientific institutions to cost accounting. The establishment of interbranch state associations, no doubt, is also on the same level. These achievements could lend a unique nature and dynamics to the Leningrad model of regional cost accounting. But so far a decision on cost accounting of the Baltic region is being made. They are already talking about cost accounting in the Kuzbass and other regions of the country. And there is very little information on Leningrad cost accounting. What is this, a fundamental position or a consequence of the real state of affairs—the lack of a concept of the economic and social development of the region?

B. V. Gidasov: All the materials on Leningrad cost accounting are on my desk. Why do we not publish them? We want to weigh everything once more. We do not want to make a mistake. Take special note: the concept of cost accounting is not a manifesto and not a diagram, but a complex multilevel program. I am following carefully the debates in the Supreme Soviet and the statements in the press and should point out: **many deputies, even leading economists, look at cost accounting in a narrow, utilitarian way, only from an economic point of view.** The concept of the Baltic republics, in my opinion, also suffers from this. God forbid that I am correct....

The point is that cost accounting to a certain extent is contributing to the development of the economy and is awakening initiative and enterprise. And in the end it is stimulating the increase of the mass of commodities. But at the same time it is leading to the serious stratification of society. Do you agree? Quite recently the concept

"group egoism" was absent in our country. Now it has appeared, just as "plant egoism" has appeared. It can be plainly stated: republic and national egoism are appearing. And this is not conducive to integration. But integration processes are under way throughout the world! The Parliament of Europe, multinational corporations as the dominant form of the management of the economy. State boundaries have been swept away! Customs barriers are being lifted!

I understand that we cannot now use this experience completely, but are we not showing too much zeal in the building of barriers? Do you know what this reminds me of on the purely psychological level? The line on payday. No one looks at how much they have credited to him—they look at how much they have credited to their neighbor. It does not worry anyone how much he will receive himself—it is important that his neighbor would receive less.

I want to be correctly understood. Authoritative scientists worked on the Baltic model, a large reserve of studies was created. And still one must not underestimate the danger of the stratification, the division of society and of tension due to this. It is necessary to be ready for it. And once again without the party organization and without public organizations we will not cope with this trend. While it, I repeat, can have very unfavorable social consequences.

Here it is appropriate to speak about scientific forecasting. I am a practical worker, not a theorist. And I believe that there is no need to describe every step in detail before you take a step. But clear guidelines are necessary. And they often do not exist, the social sciences are before are among the debtors. Even the statements of "concrete" economists in recent times have been of some indefinite, apologetic nature. Life, they say, is developing rapidly, new elements of uncertainty are being introduced, therefore, we cannot forecast anything.

And still we will be objective: the unprecedented progress of technology and the economy and the social upheaval in our country have put the social sciences in a very difficult position. Whereas previously they called us a country "with an unpredictable past," now, I believe, it is also possible to speak about a future that is hard to predict. Therefore, it is necessary to follow situations very precisely and to make adjustments in our models.

POISK: Indeed, you have headed the Leningrad Party Organization during a difficult, critical time. I noticed that the predominant motif of the responses to your election is sympathy. They sympathize with Gidasov—a scientist, organizer of production, politician....

B. V. Gidasov: But they have no sympathy for me. They simply envy me! No, seriously. I had conversations with sympathetic comrades. I say: "You must engage immediately in economic and party work." "But what will we

do there?" I reply: "It does not matter what YOU will do there, the fact that IT will make fighters out of you, is 100-percent certain!"

Improving Management of MNTK'S

18140303 Leningrad VESTNIK LENINGRADSKOGO
UNIVERSITETA SERIYA 5: EKONOMIKA in Russian
Jun 89 pp 67-72

[Article by Feliks Fedorovich Rybakov, doctor of economic sciences, professor, chief, political economy department at the Institute of Culture imeni N. K. Krupskaya, and Irina Aleksandrovna Semenova, graduate student, political economy department of the Leningrad State University humanities departments: "Interbranch Scientific and Technical Complexes: Formation and Improvement of the Economic Mechanism"]

[Text] Over the last two decades, a search has been conducted for new ways to integrate science and industry, to improve the organizational and economic management methods for scientific and technical progress. The first scientific production associations (NTO) appeared in the late 1960s, and engineering and scientific and technical centers began to be created in the 1970s-1980s. However, exploration continues in the field of organizational and economic methods for managing NTP [scientific and technical progress]. As of 1985, interbranch scientific and technical complexes (MNTK) began to be formed in the country. By the beginning of 1988, there were already 23 of them.¹

In this article, the authors' task is to study the prerequisites for the appearance of an MNTK in the political and economic aspect, and to outline several ways to improve the economic mechanism, as applied to these formations. The more so, since a number of MNTKs have been operating for over 3 years already.

In a political and economic plane, the creation of an MNTK can be considered the result of the process of collectivizing industry under conditions defined by the scientific and technical revolution (NTR). While noting the discussion nature of defining the essence of NTR, we share the concept of those authors who believe that NTR is the sum total of radical, qualitative and interrelated transformations in the means of production and, above all, in the instruments of labor, as well as in technology, organization, and the management of social production on a basis of converting science into a direct production force.² Thus, a qualitative change in production forces comprises the most profound essential characteristic of NTR, and its field of activity includes the labor resources and objects, technology as a way to unify the labor resources and objects, the organization of industry as a way to unify its individual and material factors, and labor itself as the "human work force at the current state."³

Under the conditions of NTR, the process of collectivizing production assumes qualitatively new forms, and one of its most characteristic features is the inclusion not

only of the traditional branches of material production (industry, agriculture, construction, etc.), but also of science as a sphere of production activity. At the NTR stage, the integration of science, engineering, and production into an integral system occurs.

The development of labor's social position served as the basis for converting science into an independent type of labor activity. In the 19th century, the division of science which was applied to industry apart from direct labor occurred, when previously science had been directly related to labor due to its own lack of development.

In the 1960s, the reverse process began—the integration of science, engineering, and industry into a unified formation. Precisely at this stage, the scientific and technical preparation of industry as a relatively independent field for applying socially useful labor is established.

The development of the process of integrating science, engineering and production makes it possible to single out several stages, distinguished from each other in terms of the forms for organizing and interconnecting all links in the "research-industry" process. The period of establishing Soviet science (first stage), when sectorial scientific and technical organizations (scientific research institutes and engineering-design and technological organizations (PKTO), etc.) had only just been formed, the basic part of fundamental research was characteristically concentrated not only in the academic institutes, but also in the VUZs, and applied research, as a rule, was done by the factory sector of science. The number of sectorial scientific research institutes (SRIs) at that time was insignificant, although their tempestuous growth was observed. For instance, there were about 30 scientific research institutes, large for the time, in the scientific and technical administration (NTU) by 1927.⁴ By the end of the 1930s and early 1940s, the number of industrial sectors in the country had increased significantly. Simultaneously, the number of sectorial SRIs and PKTO also grew, the specializations of which were implemented according to the technological principle, i.e., in terms of phases (stages) of the "research—industry" process.

The second stage encompasses the post war period until the end of the 1960s. It was characterized by high growth rates in the number of people employed in all links of science (academic, sectorial, VUZ), as well as by the organizational isolation of sectorial science. A tempestuous growth of independent SRIs and PKTOs occurred. Their specializations, as in the first stage, were implemented according to technological principles. As a consequence of this, an organizational and economic separation of sectorial science from ordinary production occurred. At this time, the factory sector of science was forced to create its own scientific, engineering, technological and other subdivisions in order to ensure an appropriate scientific and technical level for production. This to a significant extent because industrial enterprises had become isolated from the activity of scientific and

technical organizations which, in turn, had joined the so-called "non-industrial groups."

The third stage (late 1960s-mid 1980s) has a characteristic feature: the conversion of scientific and technical organizations from technological (by phase, in stages) specialization to object (problem) specialization. In this stage, the scientific and technical preparation of industry was converted into an organic, component part of it.

Thus, the MNTK was born in a period in which definite experience in finding and applying progressive ways to integrate science and industry had already been acquired, a period for converting the industrial cycle into a scientific-production cycle. Academic institutes, sectorial SRIs and PKTOs, and experimental production (plants, shops, sections, stations, testing grounds) support it. Hence, the scientific and technical subdivisions of enterprises (department, bureaus, etc.) should be removed. The production flowing through this entire complex chain is obtaining the necessary schemes, technological regulations, and experimental forms of items. Therefore, the need arises to organizationally and economically register the entire quantity of components of the scientific-production cycle.

The 19th CPSU Congress noted that important steps have been taken recently to improve the effectiveness of the work of scientific research institutions. Among these, particular attention was directed to the resolution on creating MNTKs.⁵

According to USSR State Committee on Science and Technology (GKNT) data, about 80 percent of new developments are introduced in only a single enterprise, where these developments were also created, 20 percent of developments—in 3-4 enterprises, and only 0.6 percent—in 5 or more enterprises.⁶ This situation is explained as follows: scientific and technical progress is, in terms of its own nature, an interbranch phenomenon, not fixed in the framework of a single, albeit very large and complex, sector. At the same time, a strictly sectorial system for managing industry has created powerful barriers of departmental interests, which it is impossible to overcome without changing, in principle, the approach to the scientific and technical preparation of production. A standard scientific and technical policy cannot be constructed and successfully implemented without overcoming said contradiction. At the contemporary level of the social division of labor, when the economic and organizational isolation of the primary links of social production engender a number of difficult economic and administrative situations, an approach to organizing the scientific and technical preparation of production is needed such that it would enable innovations to overcome departmental barriers and cross the path from idea to application at "increased velocities." Here, we should also remember that, on the whole and at a national economic level, the formation of new organizational structures and a conversion from sectorial management to management by groups of interconnected branches is occurring, to which the documents of the June (1987)

CPSU Central Committee Plenum directed particular attention. Under these conditions, the MNTKs act as the offspring of restructuring, the "navigators" for scientific and technical progress.

Thus, two basic prerequisites stipulate the need to create MNTKs. The first is reduced to transforming the object of the application of innovations itself, which in a spatial aspect will no longer appear as an individual sector or subsector, but as their definite totality. The second reduces to the interpenetration and interaction of conditions for implementing innovations. Presently, the efforts of many sectors are required for this. Consequently, raising the level of collectivization of industry and intensifying the social division of labor give rise to the need to design a system of scientific and technical preparation of production such that, in the first place, it will be capable of eliminating the contradiction between the subdivision of scientific and technical potential among sectors and subsectors and the interbranch nature of the problems being solved when developing science and engineering; secondly, it should not be oriented toward individual, albeit most progressive forms of equipment and technologies, but toward systems of machines and comprehensive technologies that exactly reflect the needs of the national economy under the conditions of restructuring.

In economic literature, the first articles devoted to the problems of the functioning of MNTKs are appearing. Thus, Ye.V. Rudneva has already attempted to definitively classify existing MNTKs.⁷ A "roundtable" meeting devoted to the problems of the functioning of MNTKs was held at the USSR Academy of Sciences House of Scientists in Moscow in December 1987.

The first result of the functioning of MNTKs, as well as the result of the theoretical study of this work, enable us to draw a number of conclusions and to outline ways to improve the activity of MNTKs. Above all, this involves the structure of MNTKs itself. In terms of the nature of formation, three types of complexes presently exist: in the first group, the head organizations are academic institutes; in the second—large interbranch and sectorial SRI (as a rule, comprehensive), in the third—the NPO. For example, the USSR Academy of Sciences Institute of Machine Studies is the head organization for the "Nadezhnost Mashin" [Machine Reliability] MNTK, and the USSR Academy of Sciences Siberian Department Institute of Catalysis—for the "Katalizator" [Catalyst] MNTK. The head organization for the "Antikor" [Anti-corrosion] MNTK is the USSR GKNT's All-Union Interbranch Scientific Research Institute for Protecting Metals from Corrosion.⁹ The "Metallurgmash" [Metallurgical Machine] MNTK is headed by the "VNI-Imetmash" NTO, and the "Mekhanobr" [Mechanical Processing] MNTK—by the All-Union Scientific Research and Design Institute for Mechanical Processing of Useful Minerals.

In Ye.V. Rudneva's opinion, two types of integration of scientific and technical organizations and enterprises of

different sectors are currently functioning. The first type is the association of institutes, PKTOs, and experimental plants, formed for purposes of development work and, as a rule, the application of fundamentally new types of equipment, technologies, and materials in the national economy. This type predominates. The second type of MNTK is created in order to offer a certain kind of service or the production of output on a qualitatively new technical and technological basis.¹⁰ In principle, this division objectively characterizes the contemporary status of the creation and functioning of MNTKs. However, the main point should not be forgotten: it is not a point of one kind of head organization or another, but of the effectiveness of the interbranch collaboration of the scientific and technical and industrial units that join the MNTK. Here, experience in scientific and technical cooperation on an intersectorial basis plays a considerable role. For example, the well-known Institute of Electric Welding imeni Ye.O. Paton has such detailed experience, amounting to decades' worth. Therefore, it is no accident that the MNTK based on it was one of the first, and that the institute itself is rightly considered the ideologue of the ideal of creating MNTKs itself.

The typical position of MNTKs stipulates that one of the conditions for their successful functioning should be an efficient system for planning, including all stages of the "research-industry" process. In fact, the all-round planning of work in the entire complex is a guarantee of the successful solution of the tasks facing MNTKs. It should be noted that for the first time a special section, "New Generations of Equipment, Technology and Materials Created by Interbranch Scientific and Technical Complexes," has been introduced in the structure of the State Plan for Economic and Social Development of the USSR for 1986-1990, in the section on "Development of Science and Technology." In the 1987 plan, 60 very important assignments to assimilate and produce equipment and technologies corresponding to the world level, that have been developed by MNTKs, have already been set for USSR ministries and departments.¹¹ However, everything was not so simple in practice: after all, by the time the overwhelming majority of MNTKs had been created, the 5-year plans for the national economic sectors had already been imposed, and therefore capabilities for ensuring the production of output according to MNTK plans were released very unwillingly. As noted by the "roundtable" meeting at the USSR Academy of Sciences House of Scientists, currently the sections for science and technology of the state and ministry plans are alienated from implementing scientific and technical developments in industry.¹² To this day, MNTKs are not the address of state planning: for the time being, the sectors and ministries are. It seems to us that in order to raise the effectiveness of the activity of MNTKs it is necessary to change this situation, starting in the 13th 5-year period. After all, under the existing planning practice the industrial enterprises are not interested in fulfilling the assignments of MNTKs.

The head organization of a complex should be the real distributor of all resources allocated for solving the

corresponding scientific and technical tasks. Meanwhile, this is also not so. Each of the participants in a complex is financed by its own department (sector).

Interbranch cooperation is the principle element of the MNTK's activity. Essentially, this is the cementing foundation of the complexes. According to 1987 data, about 500 organizations and enterprises of more than 60 ministries and departments were included in the activity of 21 MNTKs.¹³ However, there are many difficulties and unsolved problems here. Interbranch cooperation should be arranged on a cost-accounting basis. This, in our opinion, is the main thing. The real economic mechanism of an MNTK is not only a partnership based on voluntary principles. It is, above all, cooperation founded on economic levers, including penalty sanctions. Meanwhile, under the existing situation, only the formation of centralized funds for awarding bonuses for creating, assimilating and applying new equipment and the formation of centralized hard currency funds was stipulated. Unquestionably, there are not enough such economic levers. Incentive is important, but is far from the sole component of the economic mechanism. Indeed, it is also expedient, in our opinion, to form centralized funds here, which should be based on deductions from additional profits, obtained by the consumers from utilizing the production of one MNTK or another.

Proposals to create a kind of "risk fund" for the MNTKs, needed in order to support scientific work done in anticipation at the proper level, are interesting. After all, an MNTK is not asked to solve immediate scientific and technical problems, but global national economic problems related to raising the entire national economy to a qualitatively new scientific and technical level.

To this day, in accordance with the corresponding situation, the MNTK is responsible for the output only of experimental models. The situation must be reinterpreted here as well. In connection with the conversion of scientific organizations to full cost-accounting and self-financing, it is more expedient to set prices for the production of an MNTK oriented not only toward the experimental model, but toward mastering the industrial output of production.

Thus, a number of elements presently obstruct the efficient activity of the MNTK. Firstly, real rights to solve both routine, as well as long-term problems, are lacking. The enterprises and scientific and technical organizations that join the MNTK, as well as those which participate in its activity, maintain their sectorial membership (subordination). Consequently, the allotment of the necessary rights to the MNTK's head organization is a mandatory condition for the effective development of the MNTK. Secondly, the disconnection of MNTK participants among the departments interferes with the establishment of interbranch ties. We share Ye.V. Rudneva's viewpoint on the formation of MNTKs under interbranch management agencies (machine building, fuel and energy, chemical and forest, and other national economic complexes).¹⁴ Given the absence of a strictly

corresponding agency for interbranch management, it is expedient to form MNTKs directly under the USSR Council of Ministers.

Third, the "synchronization" of capacities, integrated into the MNTKs, along the stages of the "research-production" process, having above all strengthened the experimental base, must be ensured in the shortest period of time.

In summarizing the results, we note that the practical tasks of restructuring and putting the cardinal economic reform into practice have lifted questions about the effective functioning of MNTKs to the "crest of the wave," and that the rates of our society's economic and social development depend on the successful solution of these problems.

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Academician Endorses Creation of RSFSR Academy of Sciences

18140323 Moscow SOVETSKAYA ROSSIYA in Russian 16 Aug 89 p 4

[Interview with Academician Nikita Nikolayevich Moiseyev, by Vladimir Denisov: "Thoughts on the Future of the RSFSR Academy. An Interview with Academician N. N. Moiseyev"; date and place not given; first four paragraphs are SOVETSKAYA ROSSIYA introduction; last six paragraphs are SOVETSKAYA ROSSIYA conclusion]

[Text] Dear editorial board!

I am appealing to you as the only newspaper of the RSFSR. I would like to propose to think about the following: why in our, the largest union republic there are not thus far its own Central Committee, its own Academy of Sciences, and other organs, such as there are in any other republic. What, is the RSFSR deficient in something and does it own the USSR an apology for something? On the contrary, precisely it, as no one else, has done so much for the development of the country. Why are the rights of the RSFSR being encroached upon? I ask you to pose these questions without fear on the pages of SOVETSKAYA ROSSIYA.

[Signed] I. Glebov, Voronezh

Such letters are a sign of the present crucial times. The idea of the restoration (for it existed for 200 years!) of the RSFSR Academy of Sciences, as they say, is up in the air. Academician Nikita Nikolayevich Moiseyev, a well-known mathematician and a specialist in information science and cybernetics, was one of the first to formulate this idea publicly. In today's interview he sets forth arguments that were mature a long time ago—why and for what the RSFSR Academy of Sciences is needed.

N. N. Moiseyev: I link the problem of reconstructing the RSFSR Academy with the general views on the nature of

the system of the Soviet Union. It will remain henceforth a federation. The constitutions of the republics should be the basis for the USSR Constitution. The constitution of the country is first of all the Union Treaty. For the republic Fundamental Laws can be different.

The primacy of the republics should, so it seems to me, be manifested in the organization of not only state government and the economy, but also science. Precisely the republic academies of sciences should be the basic ones. Of course, several major all-union programs, such as, for example, the program of new types of energy, or the combating of AIDS, or on biotechnology are also mandatory.

But, of course, the interaction is not confined to this. At the head of union science I seem some aggregate of the republic academies, which have been united into a council. The Council of Academies is not an elected institution, but an assembly of the presidents of the academies and other officials. Its basic task is to supervise by means of all-union funds the formulation and fulfillment of all-union programs.

SOVETSKAYA ROSSIYA: Must it be assumed that the federative system of the RSFSR also requires a certain special structure of its academy?

N. N. Moiseyev: The RSFSR Academy of Sciences itself should also be patterned after the federative principle, more precisely, the regional federative principle. The RSFSR is an enormous country, academic institutes are scattered over its entire territory. Such large regions as, for example, the Far East, which it is impossible to govern from Moscow, will have great rights of independence, which, say, are sufficient for it to be included in the Pacific Ocean Economic System. Therefore, regional scientific organizations are also needed. The fact that the Far Eastern, Ural, and Siberian departments exist here, is greatly facilitating the organizational shaping of the RSFSR Academy of Sciences. I believe that a Moscow Center and a Northwest Center should also exist—with their own institutes, of course. The regional departments, which have been given great rights, will be able themselves to conclude agreements with both republic and foreign academies. The presidium of the academy as a small competent institution, which coordinates activity, manages finances, and supervises all-RSFSR programs, will unite all of them. In contrast to the All-Union Council of Academies the members of the presidium of the RSFSR Academy of Sciences should be elected.

I want to stress that the republic academies are in full accord with national, territorial, and federative tasks. The RSFSR Academy will help to use efficiently the enormous potential that exists in the RSFSR. Therefore, the scientific community should also be not a Moscow community, as it is today. Again this follows of the views of the future of the USSR. I, for example, believe that not Moscow, but some territory, which does not belong to any republic, as, say, in the United States, Brazil, and

Australia, should be the capital of the country. I understand that due to material difficulties it is now too early to talk about this, but it is important to comprehend the idea. We have fine places with a good climate, which in practice are not settled. And let Moscow remain the ancient capital of the Russian State.... It is important that Moscow alone would not be linked with the Soviet Union, with its successes, and with its failures. What do they say today? If there is a success, hence, it is an all-union success. But when there is a failure, it is a blunder of Moscow, that is, as if of the Russian people. By the way, in their consciousness there is no notion of themselves as an older brother. What kind of older brothers are we for, say, the Georgians, when they have had Christianity since the 4th century, back when the Kievan State did not exist. The Russians want to be equals among equals in everything.

SOVETSKAYA ROSSIYA: At the new academy should there also be new approaches to membership?

N. N. Moiseyev: First, the election of members of the academy cannot be linked with regions. How is it now? Here it is necessary, say, to "lure" a person to the Far East. And for this department a certain number of vacancies of academicians and corresponding members are announced. People go there for 3-5 years and return, with the retention of all privileges. Is this really useful for the state? No, of course, inasmuch as this is demoralizing. Further: it is necessary to differentiate precisely between the scientific services of a person and his position. It is not at all mandatory for an academician to be the director of an institute; let a candidate of sciences manage it, if it comes to pass. At the academy one should be elected only for one's contribution to science and for the value of one's intellect, labor, and energy.

I have already had occasion to say that groups of narrow specialists should participate in the election to the academy. It is absolutely necessary, for example, to attract for this all candidates for academician or corresponding member. The departments would form some party of electors by specialty—say, in mathematics, in physics. Then worthy people will actually be approved.

SOVETSKAYA ROSSIYA: I want to elaborate. The Academy of Sciences in itself exists because there is a need for the concentration of scientific efforts on the solution of some problems: for the regional department—regional problems, for the union academy—union problems. For in the RSFSR there are also such problems which require that there would be an academy which is directly engaged in the search for their solutions.

N. N. Moiseyev: I cannot agree with such a position. In his day M.V. Keldysh invited me to organize and head the Far Eastern Scientific Center. He spoke in approximately the same way as you are speaking: there is a need for this and that. I went there regularly for 2 years and proposed a program, which Keldysh did not accept. In what were the disagreements? Yes, there are tasks, with

which it is pointless to deal at other centers. For example, the problem of the Pacific Ocean in the broad sense of this word, the colossal number of geological problems.... But there is also a main difficulty: in such a kray, where there are approximately 5-6 million square kilometers and where about 8 million people live, there should be its own developed system of management. I believed that the Institute of Economics there should be transformed into the Institute of Economics and Management of the Far East. The goal is to establish a regional system of management, which would encompass the long-range planning and development of productive forces, the system of communications, and even the system of the computerization of the entire kray. But for all this one would have to waive the rights of "apanage principalities," which krays and oblasts essentially are....

The same thing is applicable to the RSFSR Academy. The infinite number of problems, which are arising in Siberia, the Northern Caucasus, the Central RSFSR, and other places, technological, administrative, economic, and historical problems, requires some fundamental base. When the Imperial Academy of Sciences was established, scientists were invited not in order to solve specific technical problems. This is the consequence, not the cause, rather, this is the house itself, not the foundation. That is also why Eyler and other well-known scientists, who were, it would seem, remote from practice, but created the main thing—the foundation on which the magnificent building of Russian science rose—appeared.

SOVETSKAYA ROSSIYA: I did not mean that the RSFSR Academy will deal with only the applied sciences, but namely the basic sciences.

Now let us turn to foreign experience. Now in our country people turn very often to foreign experience, particularly the experience of the United States of America. True, the question is controversial: Does everything they have suit us? Thus, let us take the United States. Its National Academy, as is known, is a public organization and exists on the dues of its members. With the government and with all other institutions it is, as we say, on cost accounting relations. Is such a version of the establishment of the RSFSR Academy possible or should we repeat when establishing it the structure of the USSR Academy of Sciences, which, roughly speaking, is a kind of ministry of basic science?

N. N. Moiseyev: I am opposed to any monopoly and any ministries. But it is necessary to see clearly a certain peculiarity of our organization of science. In the West, in the United States it is concentrated at universities and their laboratories. Our universities for their most part are not capable of performing this role. Today the question of the organization of science is of a quite pragmatic nature: what is more convenient and what is simpler is also suitable. Any system, an economic system included, is extremely inertial. Hence, restructuring is

very difficult. First it is necessary to lay new rails. And not to make sharp turns, or else one will skid....

First of all, the lack of contact between academies and universities is visible. Today it is necessary to follow the line of the thorough cooperation of science and higher educational institutions, but not as it has been up to now. So that, say, the faculty of Moscow University and several departments of academic institutes would represent a unified whole, so that instruction would be conducted mainly by people who work at the Academy of Sciences, and so that they would conduct research work, while university instructors with equal rights would conduct research work at the academy. Such would be the united scientific pedagogical collective. The cooperation of forces would also solve the problem of training the most skilled personnel. Now for the most part not people, who make modern science, but staff teachers give lectures to undergraduates. This is already a misfortune. Yes, popularizers of science are needed, here any categorical assertions are harmful. Nevertheless, leading specialists should give the basic courses and be responsible for the training of undergraduates. When such strong alliances appear, it is also possible to think about a different form of the organization of the academy.

There is another difficult question today: How are things to be financed? It seems to me that there should be a so-called system of grants, when assets are allocated for an ordered theme, with strict accountability for its fulfillment. But how is it in the West? The average processor receives, say, about \$40,000 a year. If his participates in research work, this gives him at times two- to threefold more. The scientists, who do not want to sell themselves into bondage to firms, are content with their own research work. The university provides adequate opportunities for this. But it does not pay extra for research. Note that in this case the workload of a professor is at most two lectures a week. About 25 years ago I was invited to France, so my workload there was one lecture and one seminar. But in order to "justify" the wage at Rostov University, where I once worked, I had to give five different courses and also 12-14 seminar hours weekly. So I was in no mood for science. In restructuring it, we will see such a barrier of problems, which it is impossible to rake aside all at once. Therefore, I am speaking for the present about the first steps. Napoleon once spoke a famous phrase that Vladimir Ilich liked to repeat: the main thing is to get involved in a fight. We must also first get involved in a fight. We must get involved, first of all in the discussion of problems, and understand their vital necessity. We must not put it off to a remote date.

SOVETSKAYA ROSSIYA: All right, Nikita Nikolayevich, let us assume that we have gotten involved in a fight. Let us assume that the decision on the establishment of the RSFSR Academy of Sciences has already been made. What further steps it is possible to take?

N. N. Moiseyev: First of all I would clearly separate scientific inquiry proper from research of an applied

nature. The Academy of Sciences under our conditions is obliged to accomplish an enormous number of economic tasks: in the area of machine building, aerodynamics, social problems.... I do not know how power engineering could now be developed without the participation of academic collectives. How could the space programs be fulfilled only at the departmental level? But the nature of applied and exploratory work is completely different. And it is necessary to organize them in different ways. Moreover, at exploratory institutes I would pay less—rather, guaranteed remuneration. In turn, I would pay those who elaborate applied problems more, but only for results. I had a conversation with a person who developed a system of the automation of the designing of aircraft for one foreign firm. When the system began to operate, he received as a bonus 10 annual (!) salaries. But before this he did not receive any bonuses.

If the work has been completed and there is an impact, it is necessary to pay more money. But the department, which orders the work, should do this. Here we immediately come up against the fact that the present ministries are not interested in anything. But this is a special theme. Further: in exploratory work there should also be a set of bonuses—a Lomonosov bonus, a Kurchatov bonus, and so on.

SOVETSKAYA ROSSIYA: Yet you will agree that one or two people will receive the Lomonosov Bonus in accordance with the results of the year. But hundreds, perhaps thousands of people will be engaged in research. What real stimulus do they have? For under the conditions of cost accounting in applied research many chances appear to achieve a good result and to receive a bonus. Will it not turn out that very many people will leave basic science for applied science?

N. N. Moiseyev: This is a most difficult question, it has to be settled as a unit—both by a set of nominal bonuses and by the determination of priorities—with priority financing and at times with rapid appearance in practice. And not everything is measured in money. It is somehow being forgotten that the opportunity to work in any exploratory area in itself provides enormous satisfaction, which people employed in the applied sphere do not have. I remember our takeoff in the 1950's. The collective of the computer center of the USSR Academy of Sciences, at which I worked my entire life, was concerned at that time with space. We collaborated with V.N. Chelomey and S.P. Korolev. We saw all our developments go directly from the desk to design bureaus: I can name exactly everything that was done by me personally and my closest colleagues and was at the basis of specific engineering solutions. I do not remember whether we received bonuses for them. It seems that we did not. Yes, later, in 20 years, for this four of us became winners of the State Prize. But we were thinking not about it, we considered it important that our works would really be used.

Returning to the theme of reorganization, I would like to propose: at research institutes to have special subdivisions

which would engage in basic research, being financed from the state budget. Then I would single out independent organizations that work on a state order and on cost accounting.

SOVETSKAYA ROSSIYA: Nikita Nikolayevich, the opinions that it is also necessary to change basic science over to cost accounting, are now often heard. But basic science cannot yield the national economy a return by the end of a quarter. To put it on cost accounting means to deliberately reject basic science in general, that is, our own future. Is that not so?

N. N. Moiseyev: I have already said: basic science should be developed owing to natural logic. It itself ascertains what is important today. That is why scientific seminars, colloquiums, and symposiums—both domestic and international—are so necessary. Our financial managers, who create obstacles to business trips and meetings, always anger me. They say, you engage there only in conversations. Indeed, that is the whole point—in conversations it becomes clear what is important and what is not important, with what one is to deal and with what one is not to deal. Now there is the system of scientific councils. So I would oblige each of them to publish without fail in *VESTNIK AKADEMII NAUK*, say, once a year its concept of the direction, for which it is responsible. It is a kind of public order, a recommendation to all scientists.

SOVETSKAYA ROSSIYA: But today, too, basic science, the academic institutes, in essence name themselves the themes of their research. Unfortunately, it often happens there that these themes are determined either by the internal potentials of the institution, which are not always great enough, or by the desire to satisfy one's own scientific curiosity. In my opinion, both extremes: to change science completely over to state regulation and to give it up completely to a certain self-determination, are dangerous.

N. N. Moiseyev: First of all I would like to disagree with Nikolay Bukharin, who in the early 1930's spoke of the necessity of planning any science. I believe that it is possible to plan only when you know precisely the needs and goals. In applied science it is clear, life sets more or less obvious goals. In basic science they are not clear. In a famous lecture in England Kurchatov in 1956 said that thermonuclear fusion would be in our hands in 10-15 years. While the prominent theoretical physicist Artsimovich shortly before his death in a lecture, at which I also was, warned: comrades, it is necessary to give up the illusion that we will soon master thermonuclear fusion, this is a matter of the next century.

SOVETSKAYA ROSSIYA: It seems that that is the case.

N. N. Moiseyev: The devil only knows, but, perhaps, everything will go completely differently. I am not a physicist and do not presume to judge. It is this research that it is impossible to plan. Therefore, I am talking about subdivisions, which have been deprived of cost accounting and are carried only on the state budget.

SOVETSKAYA ROSSIYA: I want to ask a question that is especially disturbing today not only the scientific community. It is a matter of monopolism in science and of the existence in it of special clans—with their own psychology and ethics and with the pulling of "their own people" "to the top."

N. N. Moiseyev: Yes, cliquishness exists, let us face it. How deep is it? I, for example, know that in the mechanics department the team of designers was very strong, they always fight together for their own people and come to an agreement with each other on candidates. But theorists in the field of mechanics do not have a clan, therefore, this department is gradually becoming more and more a design department. Now, with the arrival of the new academician secretary, it seems, the situation has changed somewhat.

Steps against clans? Democratization, nothing else has been thought up. In speaking about the broadening of the composition of those elected to the academy, I mean that this will also strike at someone's monopoly. As applied to the RSFSR Academy I will say that the first steps will determine much: what we lay today will remain for a long time. At the French Academy of Sciences the "immortals" elect themselves. But precisely there all the most prominent scientists were and are academicians. It is not that way here. But in the same France not all the most prominent writers were members of the Academy of Arts. Once I asked a Frenchman: Why? Because, he replied, the Academy of Arts was established by Napoleon during the 100 Days. He did not have time to deal with it in earnest, and quite a large number of casual people got into it. Since then over 150 years have passed, but the situation is hardly changing.

SOVETSKAYA ROSSIYA: The discussion about the fact that we hardly need sectorial academies—medical sciences and pedagogical sciences—has been going on for a long time. If the RSFSR Academy is established, will not an attempt be made to concentrated all scientific forces within one large organizations?

N. N. Moiseyev: Science should be unified, this is absolutely clear. I believe that the idea of Vavilov to establish the Academy of Agricultural Sciences was in principle incorrect. Perhaps, at that time this also seemed progressive, for large-scale science hardly dealt with agriculture. But, on the other hand, if agricultural science had been in the Large Academy, perhaps there would not have been Lysenko and Lysenkoism as well. Should it have a special pedagogical department? I believe that it is necessary to have it. Medicine should also not be separated from unified science, many of its troubles have already occurred because of this.

SOVETSKAYA ROSSIYA: Readers would probably not understand me, if I did not ask you a question that is contained today in many letters to the editorial office: Is it necessary to pay for a scientific degree, for a title, for membership in the academy?

N. N. Moiseyev: Today titles carry weight only in case of appointment to a position. They pay for work. The question, rather, is: Are academicians and corresponding members to be paid? This money provides independence. Owing to the fact that I receive these 500 rubles, I am able not to engage in a search for additional money. I do not combine any jobs. For the present additional assets under our conditions are very important. They determine the independence of a person both as a scientist and, what is no less important, as a citizen. It is probably necessary to reply to the readers that yes, in principle it is possible to agree with those who speak about abolishing this payment. But for this it is necessary to change the conditions of remuneration in general. All this also pertains to the alternative aspects of the organization of science.

Thus, let us summarize this discussion. The restoration of the RSFSR Academy, as is already clear from the first publication, raises a large number of questions. Let us indicate several:

Is a federation of republic academies possible?

Can the RSFSR Academy act as a public organization of scientists?

Who is to determine scientific priorities and how?

How is the cooperation of academic, VUZ [higher educational institution], and sectorial science to be accomplished?

We invite readers to take part in the discussion.

VUZ Officials Discuss Engineering Training

18140329 Moscow TEKHNIIKA I NAUKA in Russian
No 6, Jun 89 pp 29-33

[Interview with Doctor of Technical Sciences Professor Stanislav Stepanovich Naboychenko, rector of the Ural Polytechnical Institute imeni S. M. Kirov, Doctor of Physical Mathematical Sciences Professor Parigoriy Yevstafyevich Suyetin, rector of the Ural State University imeni A. M. Gorkiy, and Doctor of Technical Sciences Gennadiy Atrakhmanovich Bagautinov, pro-rector for scientific work of the Sverdlovsk Mining Institute imeni V. V. Vakhurshev and head of the Chair of the Electrification of Mining Enterprises, by TEKHNIIKA I NAUKA special correspondent S. V. Mindelevich, under the rubric "For the Purpose of Discussion" (Sverdlovsk): "The Tandem: 'Tekhnikum—Higher Educational Institution'"; date not given; first six paragraphs are TEKHNIIKA I NAUKA introduction]

[Text] Our special correspondent S.V. Mindelevich, while in Sverdlovsk, addressed the following questions to three VUZ executives.

1. What do you think: Does the overproduction of engineers exist in our country?
2. Is the introduction of a fee for young specialists having a positive effect on the quality of their engineering training, assignment, and use?
3. What can vocational guidance, occupational selection, and testing provide for the improvement of higher education? When is it best to conduct them—in school, upon enrollment in a higher educational institution, or after graduation from it?
4. Is the percentage ratio of male and female students at technical higher educational institutions now optimal?
5. Is the establishment of "tekhnikum—higher educational institution" tandems promising from the standpoint of the organization of the system of continuous education?

Doctor of Technical Sciences Professor S.S. Naboychenko, rector of the Ural Polytechnical Institute imeni S.M. Kirov

Stanislav Stepanovich Naboychenko is one of the youngest rectors in the country (he was born in 1942 in Simferopol). He graduated from a mining and metallurgical tekhnikum, the Ural Polytechnical Institute, and graduate studies. He is a metallurgical engineer in non-ferrous metals. He worked 10 years at the Ural Scientific Research Institute of the Copper Industry as head of a laboratory. In 1976 he was hired through competition at the Ural Polytechnical Institute for the position of docent. Since 1980 he has been a doctor of technical sciences and since 1982 a professor and head of a chair. He was the dean of a faculty and secretary of the party committee and since 4 December 1986 has been rector. He is the author of 220 published works, 5 books, and 30

inventions. His scientific interests are connected with the pressure hydrometallurgy of heavy nonferrous metals.

1. There are two answers to the question of the overproduction of engineers. The first is: there is an overproduction of engineers, but not of all specialties. Many specialists of the mining and metallurgical, chemical, and construction type are scarce; there are not enough economists in specific specialties (for example, metallurgical economists). We see this from our own example. The assignment of metallurgists took place here, but there proved to be far more clients, who want to obtain our graduates, than young specialists.

The second answer. In the Union there are "firm" higher educational institutions, the graduates of which are grabbed up, and there are higher educational institutions of low prestige. For example, everyone needs the graduates of the Moscow Higher Technical School imeni Bauman, while the graduates of some outlying institute can count on the attention of only local enterprises and organizations. Why? Because any higher educational institution gets on its feet not in 10-20 years, but after decades. And it is not by chance that the older a higher educational institution is, the more solid the school, the training, the supply, and so on at it are. Our institute is grouped precisely with such significant higher educational institutions. By 1990 the Ural Polytechnical Institute will have trained 125,000 engineers. This is very many. I believe that there are not more than 10 such higher educational institutions in the country. Yet not only quantity, but also quality are important. The fact that N.I. Ryzhkov, B.N. Yeltsin, several union ministers, ambassadors, several tens of academicians and corresponding members, 11 Heroes of the Soviet Union, an enormous number of executives of enterprises, chief engineers, executives of other higher educational institutions...are among the graduates of the Ural Polytechnical Institute, testifies to it. In short, such a higher educational institution, of course, is capable of accomplishing the tasks on the engineering support of the country at the necessary level, that is why we do not have problems with assignment, we do not sense an overproduction of engineers.

For the benefit of the matter it is necessary to close second-rate higher educational institutions which are not ensuring training at a modern level.

3. The introduction of a fee for young specialists is, of course, a useful step. It disciplines both the higher educational institution (we understand that the product, for which they pay us, must be produced as a high-quality product) and the enterprise. We send to some enterprises 30-40, even 100 people, it is necessary to pay for them 300,000 rubles! Therefore, they will begin to ponder there—Do they actually need that many specialists?

In the last 2 years the following trend has already emerged—several enterprises, having changed over to

cost accounting, have begun to decline graduates, that is, to keep more precise track of their manning table and not to hire extra people. There, of course, the introduction of a fee for a graduate has also had an effect. But it, without a doubt, is only a partial fee, for the outlays on the training of an engineer, for example, at our institute come to 30,000-50,000 rubles. The sum is large, because we have increased appreciably the intensity of instruction on computers, we also have much other expensive and even unique equipment. But this partial compensation, these 3,000 rubles, for the present are being paid very reluctantly by enterprises.

When we change over to individualized special training, we will immediately increase the fee. We will conclude contracts with enterprises: we train for you, for example, 10 specialists in computer-aided design and give them such-and-such qualities and knowledge, but require for them such-and-such a contract price. If the enterprise is unable to pay us more than the established 3,000 rubles, we will not refuse to take it in "borzoi puppies"—equipment, materials, and so forth.

But in general, for the present 3,000 rubles are sufficient. By means of them the education of enterprises—their getting accustomed to the fee for specialists—takes place.

3. To our deep regret, the graduates of schools, who come to us, have been programmed to think that to get a favorable grade it is necessary to retell a theme exactly according to the textbook, that is, the system of instruction at schools is oriented toward memorization. And we have a very hard time with such youngsters, especially in the lower classes. To stimulate thinking we organize unusual situations, business games.... And these techniques do not always work. The lack of skills of thinking among graduates of schools has now become typical, and no higher educational institution will be able to train highly skilled specialists, if the system of instruction in the school is not changed. But then the graduates of *tekhnikums* are more practical, more uninhibited.

Everyone knows how many engineers are working in the service sphere—as salesmen and waiters—and are not using their store of VUZ knowledge. An engineer graduates, for example, from the Moscow Higher Technical School, but works as a taxi driver.

Why are young engineers not working in their specialty? There are two basic circumstances here. First of all it is important whether the graduate of the technical higher educational institution appeared as a creative individual and whether technical creativity became his life's work. It is desirable, of course, to identify the aptitude for this back before enrollment in an institute. And the second one is the attitude toward the young specialist at the enterprise. When they support a dynamic, capable fellow, he quickly develops, makes a career, performs more duties, receives more—he is attached to the enterprise. When they take a consumer's attitude toward graduates, without pondering over each young engineer

and without directing attention to him, this person leaves the enterprise. He seeks a more interesting or favorable job.

4. In the 1960's, 60-70 percent here were boys. Now we are experiencing difficulties. There are a number of specialties, in which there is nothing for girls to do. For example, metallurgy and chemistry involve difficult working conditions. As practical experience shows, women, who are specialists in these fields, settle down at best in the system of the bureaucratic apparatus. Now they are saying at these enterprise: we do not hire girls! And this year we came to an understanding in several faculties: other things being equal, in case of admission to the institute we are giving preference to boys.

In official documents, of course, there are no such restrictions. Therefore, we simply do not recommend that girls enroll in the physical technical and metallurgical faculties, being guided by humane considerations. We are performing explanatory work and are telling female entrants that women, future mothers, should not work under dusty, difficult conditions. I believe that it is incorrect not to warn them about this.

And in general technical higher educational institutions as a whole are more suitable for men, who like to tinker with "pieces of iron." But at these higher educational institutions there are more female students. Why? Because the level of training among girls after graduating from school is higher than among boys—often due to better memorization and learning by rote. And at the institute girls learn better for the same reason. But in industry the opportunities of our female graduates are very limited. You will not always hire a woman in a shop, here they work in divisions, in this case the efficiency of the acquired knowledge and its use are low. But girls are needed for a normal social atmosphere at the higher educational institution. I would consider it ideal if at our institute there were 70 percent male students and 30 percent female students—after all, we have for them, for example, the engineering economics faculty and individual specialties of the mechanics and machine building faculty and the construction faculty.

5. A few words with regard to the experiment in the "tekhnikum—higher educational institution" engineering pedagogical institute. We have also connected a number of our faculties up to the corresponding *tekhnikums*, since there are many of them in Sverdlovsk. For example, we formed the tandem: the metallurgical faculty—the metallurgical *tekhnikum*. We are now performing such work to the utmost, are joining curricula, and are developing joint understandings. There is much here that is useful and efficient. What is more, in four specialties we have organized concentrated instruction (4.5 years instead of 6) for the graduates of *tekhnikums* along the lines of correspondence instruction—for example, in the specialty "economist-construction worker." It has been organized here this way for about 2-3 years now. In the day department we will proceed to

this starting with the next academic year. These are our plans. But here everything depends not only on the institute.

What difficulties are there? We are a higher educational institution of the State Committee for Public Education, while several tekhnikums are of sectorial subordination. It is good when a person comes to us from a sector, undergoes training, and returns to the same sector? But what if he goes to another sector? That is why tekhnikums here are being overcautious, although they liked the idea. This is a good thing: both instruction time and assets are being saved.

It would be useful to merge similar tekhnikums and the higher educational institution into a unified complex. In developing this idea, we are also directing attention to the lower level of education—we believe that it is also necessary to involve the school here: we have now organized specialized classes at several schools of the oblast.

Even though this sounds like a fantasy, at our institute there are also two kindergartens, we are also slowly penetrating there. We organized a "zero" grade for 6-year-olds, furnished it with equipment, and intend to give it computer hardware. The influence of our students on the kindergarten is significant: we go there as sponsors, give concerts, and help to teach the children. Thus, starting with kindergarten we are forming a "background" of our higher educational institution.

**Doctor of Physical Mathematical Sciences Professor
P.Ye. Suyetin, rector of the Ural State University imeni
A.M. Gorkiy**

Parigoriy Yevstafyevich Suyetin, born 1927. He was born in the Urals in a large peasant family. He graduated from the Ural Polytechnical Institute in 1951, having acquired the specialty of engineer-physicist. He studied in graduate studies of the Institute of Atomic Energy imeni I.V. Kurchatov (Moscow) and defended his candidate dissertation in the field of nuclear technology. In 1971 he defended his doctoral dissertation. He worked in the Physical Technical Faculty of the Ural Polytechnical Institute as an instructor, docent, head of a chair, and dean. Since 1976 he has been rector of the Ural University and head of the Chair of General and Molecular Physics. He is an honored figure of science of the RSFSR and has been awarded two Orders of Labor Red Banner.

1. Indeed, we are training too many engineers, due to which the quality of their education is suffering. It is necessary to reduce the number of technical higher educational institutions and to leave the training of specialists to those of them, which can actually do this properly. The criteria are first of all the personnel potential of the higher educational institution, the technical equipment, and the development of scientific research. But, on the other hand, several figures disturb me. In the United States, where there are 3,284 universities and colleges, a fourth of the adult population of the

country is covered by higher education. Whereas in our country there are 3 million students in the day departments, in the United States there are 3.6-fold more of them (11 million). So how is one to act—reduce the number of people, who receive a higher education, and close higher educational institutions or take some other route? For a higher education is needed not only for work, but also for the spiritual life of a person, especially a humanities education. Well, if we reduce the higher educational institutions, we will deprive people of the opportunity to become familiar with sciences. Will this conform to the goals of our society? I am not sure.

And still, since we have sufficiently many higher educational institutions, especially of the natural science type, and it is not that difficult to enroll in them, the motivation among students to study is decreasing. But it is impossible without it to train a good specialist, no matter how many computers we buy and how we supply the higher school with them. Moreover, the old mechanisms, when no one looks at the enclosure with the diploma, in which the grades of the student are indicated, remain in force. And among students the impression is created that it is necessary not so much to study well as it is to get a good job.

2. The putting of statutes into effect, when it will be necessary to pay for every graduate of a higher educational institution, will, of course, force enterprises in the future to be more discriminating toward those, whom they hire, and us to treat more responsibly the training of specialists. Today, unfortunately, this makes no different to enterprises, since our economic system spurns economic interest in scientific and technical progress. The adopted Law on the Socialist Enterprise does not stimulate scientific and technical progress. As long as plants and entire ministries act as exclusive monopolists in some sector of production, such stimuli will not appear. Why try to make something better, if there are no competitors? Therefore, if the labor collective is given the opportunity to dispose of the entire profit of the enterprise, I am not very confident that this collective will begin to allocate money for scientific and technical progress. It will more likely channel the assets into social amenities and into wage increments—For what, they say, would we spend assets on scientific and technical progress? What will we have from this? In 5 years 50 rubles added to the wage? Better give us 10 rubles today, and we do not need any scientific and technical progress.

The higher school does not exist by itself; the general shortcomings of the economic mechanism also affect it. And we have, if it can be put this way, the dictation of the producer over the consumer—no matter how many specialists they train, enterprises will buy up all of them, regardless of the "quality." Why? In particular, because now the labor of an engineer does not require such skills as, for example, 40 years ago. It has become more routine and do not require thorough knowledge. Precisely for this reason the motivation to study among students is also disappearing; therefore, enterprises are also approaching us and those, whom they send to them, not

very strictly. Enterprises are not concerned about receiving through assignment the most talented, best students. And the introduction of a fee for specialists will hardly help the matter immediately: 3,000 rubles are not that much. Moreover, we received for the graduates of last year only 68,000 rubles instead of the expected 500,000 rubles!

The trouble also is that the former, stagnant times also affected higher educational institutions? How did they fight the last 20-30 years for progress in studies and for the decrease of the dropout rate? I said to a dean: Why are there in our faculty such a large dropout and low progress in studies? Steps must be taken! That is how we trained during this period an entire galaxy of instructors, who do not give a damn about the knowledge of the student. When an instructor has worked about 20 years in such a system and is regularly criticized for D's (if he gives one, it is nothing, but for five they already say to him—"you are teaching poorly"), he will try to conceal those not making progress.

Today we have a basic task—to increase the exactingness of instructors. Chairman of the State Committee for Public Education Yagodin proposes to give examinations in writing, so that, let us assume, I as a rector could "teach a lesson" to the excessively liberal instructor—here, they say, is what the question was, and here is what the answer is. It is probably also possible to advance that way. But this, in my opinion, will lead to the further bureaucratization of education. What creativity there is there! We are trying to invent mechanisms of coercion only because the main mechanism—interest in the matter—does not work.

3. We are now talking a lot about vocational guidance and about the fact that the school child should already be given guidance as to who he will be—a mathematician, a designer, a philologist. It is also possible to introduce such testing in case of admission to a higher educational institution. This, of course, concerns mainly higher educational institutions, where not simply a head, but a love for work is needed. These are first of all medical and pedagogical specialties—here it is not enough only to have knowledge, special aptitudes are also needed.

But it is possible to determine properly one's calling and to find out precisely whether a young person has arrived there, only by having spent time studying in the first year and having cooked for a while in this "kettle." Testing in a certain sense should also take place when graduating from a higher educational institution. It is assumed that the existing state examination commissions play the role of a certain technical control division. However, VUZ specialists for the most part are on them, we are actually certifying ourselves. Although, of course, it is recommended to bring in specialists from scientific research institutes and enterprises as members of the state examination commission. But this system does not work.

I do not see another way to arrange examinations at plants and at the institutions, to which they send specialists. If a young specialist, a mathematician, for instance, failed the mathematics tests, they say to him: "For the present we do not need you."

It is also necessary to see to it that a well-informed student would end up in a good place. While a student, who does not make very much progress in studies and does not strive to acquire knowledge, would not end up in the most prestigious sectors. And again everything comes up against the lack of interest of our industry in scientific and technical progress. If an interest does appear, "clients" will come to higher educational institutions to pick the students they need and will stimulate them—they will supplement the stipend, so that they, after graduating from the institute, would come to this enterprise to work. And the student, knowing that they are following his success, would actually acquire the necessary knowledge and skills.

4. We have for the university as a whole about 70 percent girls. At the physics faculty they make up 50 percent, the philosophy faculty—50 percent, the mathematics faculty—70 percent, the chemistry faculty—85 percent, and the philology faculty—90 percent. Except for the obvious contraindications connected with female physiology—this concerns, for example, the work of miners, steel makers—I would not introduce restrictions with respect to sex in case of admission to higher educational institutions.

5. With regard to the experiment with continuous education according to the "tekhnikum—higher educational institution" arrangement. Here one should take into account that the program of the tekhnikum is not an abbreviated VUZ program, but a completely different one. Therefore, it seems to me, it is more logical to do the following—young people enroll in a higher educational institution and study 2 years, then those lagging behind are transferred to a tekhnikum, if they wish. Everyone receives more or less identical basic knowledge, while the practical knowledge, which they teach in the upper classes, is different at the higher educational institution and at the tekhnikum.

Doctor of Technical Sciences Professor G.A. Bagautinov, protector for scientific work of the Sverdlovsk Mining Institute imeni V.V. Vakhrushev and head of the Chair of the Electrification of Mining Enterprises

Gennadiy Atrakhmanovich Bagautinov was born in 1931 in the Mari ASSR. He graduated with honors from the Sverdlovsk Mining Institute in 1953 in the specialty engineer-electrician. Then for 6 years he taught at a mining tekhnikum (Karpinsk) and enrolled in graduate studies of the Sverdlovsk Mining Institute. After defending his dissertation in 1963 he worked there as an instructor and docent. After 10 years he defended his doctoral dissertation and became a professor and head of the Chair of the Electrification of Mining Enterprises.

Since 1978 he has been prorektor for science. He has about 300 scientific works and more than 40 inventions.

1. I believe that in the country there is some overproduction of engineers. Must the number of higher educational institutions be reduced? Probably. Here it is necessary to take into account that there are strong and weak higher educational institutions. For example, at some higher educational institutions our mining specialties exist only in individual faculties, and, I believe, this is not the best solution. It is necessary to concentrate the training of mining specialists at leading higher educational institutions, while it is hardly advisable to develop it wherever it takes place in individual faculties.

2. For the present higher educational institutions have practically nothing from the introduction of the fee for young specialists. And besides, this sum is very small, the training of an engineer costs far more. Inasmuch as higher educational institutions are now expanding their material base mainly by means of scientific research and contractual work, and not the state budget, the change-over to the fee for specialists will make it possible to conduct this work more intensively. So that this step was correct, and at the first stage it is even possible to be content with the sum of 3,000 rubles, provided we will actually receive it for each specialist. For our higher educational institution can now spend 400,000-500,000 rubles a year for the acquisition of equipment and the outfitting of laboratories. This is entirely inadequate, although the committee is also helping us in a centralized manner, since our institute is the main one for the program of computer-aided design in mining.

3. Testing when enrolling in an institute is not a new thing. After all, there were years when, in addition to examinations, an interview on the specialty was also conducted without fail; its results were taken into account during competitive selection for a higher educational institution.

Often school children due to inadequate vocational guidance, after receiving a school graduation certificate, do not know where to go. They often go where the competition is less. And only later, in the process of instruction at a higher educational institution, do they understand that they enrolled in the wrong place.

It is probably necessary to conduct some kind of psychophysiological testing, at least for some specialties. But, I believe, the results of testing for the present should not affect admission to a higher educational institution, but

should serve merely for the information of the entrant and the instructors of the higher educational institution.

4. We annually accept two or three girls to our chair, which jointly with another chair trains mining electrical engineers, in order, so to speak, to dilute somewhat the student body. At our institute approximately 20-30 percent of the students are girls. The exclusively male specialties are those which are connected with underground jobs. Greater demands are made on them, and in practice we do not admit girls there.

There are a number of other specialties, in which it is undesirable for girls and women to work. And not only due to difficult working conditions. These are, for example, specialists in geological surveying service and in the construction of underground structures, mining electrical engineers, and electricians. But we also have other technical fields, in which girls can work successfully—for example, at ore dressing factories.

Girls traditionally enter geological prospecting specialties. The romantic side is attractive, although in recent times it has given way a little to practicality, there are slightly fewer girls here. For not only field jobs exist, there are also many laboratory jobs. The labor of female geologists is also being used in them. The number of laboratories for the processing of primary materials has also increased. These laboratories are furnished with modern equipment—there female labor is efficient.

Upon enrollment in the higher educational institution we immediately explain that it is better for girls not to enter some specialties, although there are no official restrictions (except for underground jobs), the competition is identical, there is no sexual discrimination.

5. About the experiment at the Sverdlovsk "tekhnikum—higher educational institution" engineering pedagogical institute. I believe that this experiment is interesting. Such an organization of instruction is suitable not only for engineering pedagogical specialties—a number of other specialties, in which it is possible to use this experience, probably also exist. In Sverdlovsk, for example, there is a mining and metallurgical tekhnikum; therefore, it is also possible to think about the improvement on this level of the training of miners: to establish an educational association of the tekhnikum and our institute. And on the scale of the entire country this matter is worthwhile.

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U.S., Soviet Secrecy Policies Criticized

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No 15, 1 Aug 89 pp 1, 2

[Article by Doctor of Economic Sciences Professor Boris Rayzberg under the rubric "Point of View": "The Cost of 'Nondivulgence'"; first paragraph is POISK introduction]

[Text] Two articles of nearly the same content recently appeared in the Soviet and American press. Vladimir Rubanov, chief of a department of the Scientific Research Institute of the KGB, wrote one of them entitled "From the 'Cult of Secrecy' to Information Culture." The other—"Necessary and Unnecessary Secrecy"—was written by former U.S. CIA Director Stanfield Turner. It is paradoxical, but both very competent representatives of services, which are in charge of state secrets, state in unison: excessive classification has passed all reasonable limits, it is leading to unnecessary expenditures and has become a powerful buttress of the state bureaucratic machinery. The guardians of state secrets declare: we have enough secrets.

Among the secrets, which are being valiantly protected on the same level as data on defense facilities and new weapon models, the information on the organization and operation of the very system of classification holds a worthy place. The lists of information, which contains a state secret, are classified in the same way as the instructions on the handling of classified information are. Every staff member is obliged to conceal the fact of his involvement in such operations. But whoever all the same attempts to lift the curtain of secrecy, it turns out, is divulging a state secret. And he can be punished. It is a good means of discouraging open discussion, is it not? While living in an atmosphere of complete silence, we isolated the institution of secrecy from society.

And oh how many of these secrets there are! Instead of clear legislatively established rules on what to regard as a state secret, in our country any department ecstatically draws up enormous lists, putting on them everything that will simply come to mind.

For example, the names of designers and scientists in the field of space rocketry, who were well known both in the country and, what is the primary thing, abroad, were classified. While American radio and the press announced to the entire world that Sergey Korolev had again brought his rockets for testing, in our press the creator of space complexes appeared as the nameless "Chief Designer." Is it obvious nonsense? Without a doubt. Only here no one has yet gotten into trouble for "overclassification," but for "insufficient classification" it is possible to lose both one's position and one's head.

Four levels of classification of documents exist in the country: "top secret," "secret," "classified," and "for official use only." The so-called security classification is constantly set too high—yet not by the services, which

protect secrecy, but by the performers and expert commissions. To be on the safe side, out of the fear of "making insufficiently secret." What the reliability of the established classification is worth becomes clear in instances of the unintentional loss of documents. In such a situation an ad hoc commission immediately establishes that the original classification was set too high and most often transfers the document to the category "for official use only," that is, in essence turning it into an unclassified one and sparing the person who lost it from punishment.

The entire classification system is susceptible to anarchy. Information on the number and deployment of troops, for example, is a secret in wartime, but in peacetime it is not a plug nickel. The many years of concealment of information on the size, strength, and armaments of our army had the result that the United States set up a satellite reconnaissance system with the use of optical devices and heat radiation indicators, which makes it possible to detect and identify on USSR territory objects measuring as little as 1 meter. By means of a vast reconnaissance network and on the basis of indirect data research organizations of a number of countries get an annual picture of Soviet armaments. So that we ourselves, without knowing this, have contributed to the present well-informed state of foreign intelligence services.

Or, for example, you will not find the name of a defense organization in any directory, but in the immediate vicinity any resident will easily inform you about all the sought abbreviations. The telephone directory in Moscow will never tell you the telephone number of the Institute of Atomic Energy imeni Kurchatov, which any foreign correspondent in Moscow knows. You, of course, will be outraged by this absurdity, but they will answer you sternly: "The information is classified."

It seems that in the modern world, where economic competition is gradually superseding military confrontation, it is wise to focus basic attention namely on economic secrets. Of course, not on all of them. One can but marvel, having found out that many Soviet economists use verified foreign information on the economy of their own country, since the corresponding data in our country, it turns out, are secret.

But then it is necessary to classify the information on new scientific and technical developments, technological processes, materials, inventions, and discoveries at the initial stage of their emergence. First of all in order to patent them in good time, and then to sell them profitably, having thereby prevented the use of our own intellectual valuables by foreign firms. One must not spare assets and forces for this.

The comparison of both expenditures and losses serves as the only objective criterion of the expediency of classification.

In the United States approximately 20 percent of the assets, which are allocated for new developments, are

spent on measures on the protection of scientific and technical secrets. If we consider that the annual value of new scientific developments in the USSR comes to about 30 billion rubles, it turns out (according to the same methods) that we are spending 6 billion rubles on classification. Approximately half of the enterprises of industry, transportation, and communications have services for the protection of secrets—so-called first departments. If the expenses, which are connected with their activity, are estimated at 2 percent of the total expenditures in these sectors, we will get another 10 billion rubles.

But the direct expenditures on the upkeep of secret services cannot be compared with the indirect losses! Take a look at the entrance gate of any enterprise that is known by the code name "mailbox"—they will not let you beyond the entrance gate, no matter what extra important matter has brought you here. Without a pass? Impossible! While no one, naturally, is concerned about how much effort and nervous energy have been spent at the bureau of passes. And how much money has been spent on the upkeep of these innumerable bureaus of passes....

But this is still the beginning. While here is what is to come.

Owing to the mutual suspiciousness of the countries that are opposing each other militarily, to which secrets have given rise, in order to increase "the safety margin" to be on the safe side, they are increasing the production of classified weapons by 30, or else 50 percent above the level necessary for the maintenance of a balance. But for the country this is already costing tens of billions of rubles a year. Say what you like, it is a tidy fee for secrets.

Now let us add what we are failing to obtain due to the fact that owing to classification we cannot introduce in

everyday life the achievements of scientific and technical progress in defense sectors—and we will derive tens of billions of rubles more income. As a result, however you calculate, classification is costing us a good 50 billion rubles. If not more.

What steps can we take already now in order to introduce reasonable rules of the operation of the system of the protection of secrets?

1. Draft and put into effect a law on the state secret, which regulates classified activity.
2. Decrease sharply the amount of information and data, which are liable to classification, having focused attention on the assurance of the safeguarding of truly state secrets.
3. Make information an object of ownership with all the ensuing rights of the owner to have and dispose of information and to use it and with the obligation to be accountable to the law.
4. Assign to the state budget all the expenses on the compensation of the economic harm caused by classification.
5. Assign to enterprises all the expenses on the assurance of the safeguarding of the secrets established by them, including the expenses of consumers.
6. Make decisions on the grouping of information with classified information precisely by the comparison of the attainable economic and social impact with the expenditures and the missed profit.

And a final thing. Before my article will be signed to press, a representative of the Main Administration for Safeguarding State Secrets in the Press will read it. Thus, perhaps, today, in the age of glasnost, the newspaper of scientists could also manage without this.

Report on April 1989 Session of Kazakh Academy of Sciences

President's Introductory Remarks

18140321 *Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 7, Jul 89 pp 5-11*

[Speech by President of the Kazakh SSR Academy of Sciences and Academician of the Kazakh SSR Academy of Sciences U. M. Sultangazin at the session of the General Assembly of the Kazakh SSR Academy of Sciences on 26 April 1989, under the rubric "The Session of the General Assembly of the Kazakh SSR Academy of Sciences": "The Opening Address"]

[Text] The activity of the Kazakh SSR Academy of Sciences in 1988 was aimed at the implementation of the decisions of the 19th All-Union Party Conference, the further intensification of restructuring, the concentration of forces on the priority directions, and the increase of the practical return of research. The results of the activity of the academy will be covered in the reports of the vice presidents and the chief scientific secretary; therefore, I will dwell only on the basic achievements, as well as on the shortcomings in our work and the tasks on the restructuring of the activity of academic institutions for 1989.

During the year under review 2 applications for discoveries were registered, 435 applications for inventions were submitted, and about 400 inventor's certificates and positive decisions on their issuing were received. The economic impact from the introduction of developments of the academy came to about 15 million rubles.

The USSR State Prize in Science and Technology was awarded to 3 people, the Kazakh SSR State Prize was awarded to 12 people, 9 associates were winners of the prize of the Kazakh SSR Council of Ministers. One institute was awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Komsomol Central Committee. These are high appraisals of our scientific achievements.

The academy continued to develop traditional directions, as well as priority directions that are new for us, by strengthening ties with sectorial scientific research institutes and higher educational institutions of the republic. Much work was done on the implementation of the measures stipulated by the decision of the Presidium of the USSR Academy of Sciences on the increase of the effectiveness of scientific development and the strengthening of the material and technical base of the Academy of Sciences of 27 May 1988. Work was performed jointly with the Kazakh SSR State Planning Committee on the formulation of regional scientific and technical programs on ecology and the complete use of the mineral raw material resources of the republic.

The development of basic research and the bringing of its results closer to the world level are the main area of activity of the academy and the basic direction of restructuring.

In the field of the physical mathematical sciences the results of studies of questions of mathematical physics, functional analysis, mathematical logic, and mechanics received world and union recognition.

In the field of the earth sciences the new Yuzhnyy Turgay petroleum and gas basin was identified, the presence of petroleum and gas in the Zaysan Depression was established; the work on the substantiation of the regional laws of the formation of the composition and the thermodynamic conditions of the ground waters of Western and Southern Kazakhstan was completed.

Diverse and interesting work was performed by scientists of the chemical technology direction of science: a fundamentally new design solution of the technology of obtaining lead of high purity was developed; a scientific base of flexible resource-saving technological processes of the synthesis of long-acting phosphorus fertilizers, the increase of their ecological cleanness, and the obtaining of multipurpose phosphate materials was developed.

In the field of the biological sciences the dummy of a map of the vegetation of the Semirechye was made up in accordance with the materials of space photographs; the informosomes of the pollen tubes of the tobacco plant were identified and studied for the first time.

Substantial results exist in the field of the social sciences, to which many just reproaches have been addressed in recent years: the idea of developed legal consciousness as a necessary component of the new thinking under the conditions of the formation of the legal state was substantiated; much work is being performed on erasing the "blanks" in the history of Kazakhstan, the works of Shakarim Kudaybedyyev were prepared and published, the materials on the creative legacy of Magzhan Zhumabayev, Akhmet Baytursynov, and Zhusupbek Aymautov were studied.

Today the role of basic science is growing. A number of decrees of the CPSU Central Committee and the USSR Council of Ministers, which were adopted with respect to the acceleration of the development of such basic directions as mathematics, high energy physics, biotechnology, machine building, and others, testify to this. The directions of basic research, which govern the development of leading technologies—microelectronics, robotics, information science, biotechnology, and so on—require particular attention.

Critical tasks were specified in the decree of the CPSU Central Committee and the USSR Council of Ministers on the intensification of scientific research work in the field of mathematics. It is necessary to develop scientific support for the extensive use of the methods of mathematical simulation and computer technology in the sectors of the national economy. On this level it should

be noted that a chair of information science for the training of graduate students and associates has been formed, a department of applied mathematics is being organized at the Central Kazakhstan Department. Research on the development of automated control systems of technological systems, as well as a computer-aided design system of machine building and a system of the processing of space images is undergoing development at the academy. Prominent specialists from outside have been brought in to supervise these directions. The research on scientific instrument making and semiconductor physics is very promising. At present the physical technical department of the Institute of High Energy Physics of the Kazakh SSR Academy of Sciences is dealing with the problems of semiconductor materials science, the technology of growing thin-film structures, and the development of techniques of the directed change of their physical properties with the use of ion implantation and various types of nuclear radiations. The establishment on its basis of the Physical Technical Institute with a large experimental base is now the main task.

Integrated geological-geophysical and geochemical studies of the structure of deep strata of the earth's crust and upper mantle and of the processes of the formation of ground waters and mineral deposits with the use of advanced methods should be intensified.

The work in the field of chemistry should be concentrated first of all on the development of highly efficient catalysts. It is necessary to speed up the formulation of the scientific principles of petrochemistry and the obtaining of organic products.

The work in the field of biotechnology, soil science, and the protection of plants and animals is of scientific and practical interest.

Extensive research has been planned within the framework of the republic program "Man, Science, and Society." Problems of interethnic relations accumulated during the years of stagnation. The distortions and errors in national policy of past years and the neglect of the necessity of studying national questions and taking national peculiarities and traditions into account like painful abscesses are appearing and being felt now, influencing most adversely the cause of our restructuring. At the session of the republic Academy of Sciences, which was devoted to the implementation of the decisions of the 19th All-Union Party Conference, Secretary of the Kazakh CP Central Committee U.D. Dzhaniybekov raised a large number of urgent problems for our social scientists. Attention was directed to the still inadequate study of the question of national and interethnic relations, the problems of bilingualism, and the history of Kazakhstan. The Center for the Study of National and Interethnic Relations was established in the structure of the Institute of Philosophy and Law of the Kazakh SSR Academy of Sciences for the broadening of basic research on the problems of the improvement of national relations, the standards of interethnic contacts,

and international and patriotic education. A comprehensive research program for the period to 2005 has been formulated. Measures on the preparation for the CPSU Central Committee Plenum "On the Improvement of Interethnic Relations in the USSR" are being implemented.

The attainment of leading levels in modern science requires the constant analysis of world-level achievements and the objective evaluation of the scientific results of our institutes. However, as the conducted survey showed, the information supply of institutes is not at a high level. Moreover, our scientists do not often turn to the available foreign literature. This applies more to the institutes of the Earth Sciences and Biological Sciences Departments.

Our articles and books are still not being translated enough into foreign languages, which is an indicator of the quality of the research being conducted. The theoretical scientific level of many journals remains low. The aspiration among some scientists for the exaggeration of their results and ostentation is being noticed.

I should say that a leading role in the evaluation of research should belong to scientific councils. However, today they are not displaying particular adherence to principle and their work does not meet the requirements of restructuring. The participation of the councils in the formulation of forecasts and the coordination of scientific development is inadequate. I will cite the following examples. In the process of formulating themes on a competitive basis the councils, in essence, stood aloof from the discussion of the works that had been proposed for the competition, although this is their primary duty. I regard as justified the criticism addressed to the Academy of Sciences at the Kazakh CP Central Committee Plenum for the poor coordination of scientific research, which pertains first of all to problem councils. We evidently need to revise the existing scientific councils. We should, perhaps, form them all over again and orient them toward the identification of priorities and the making of strict evaluations.

The speeding up of the attainment of the world level should also be ensured by participation in and the implementation of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000. Only two of our institutes: the Institute of Molecular Biology and Biochemistry and the Institute of Microbiology and Virology, are involved in work within this program.

The development of new resource- and energy-saving technologies, retooling, and the modernization of the national economy should hold an important place in our activity. The question of increasing the effectiveness of scientific research in the interests of the national economy was the subject of a detailed discussion at the meeting of leading scientists with Candidate Member of the Politburo of the CPSU Central Committee and

Secretary of the CPSU Central Committee G.P. Razu-movskiy and leaders of the republic. However, the timely use of the achievements of science in the national economy thus far remains a bottleneck. The national economy could obtain already today a large practical return from the output of block and granulated catalysts. A decision was made on the organization of their industrial production, particularly block catalysts, at the Alma-Ata Plant of Heavy Machine Building in the volume of 100,000 units a year. The need for them is significant—the Volga Motor Vehicle Works alone has placed an order for 1.5 million units. However, the practical implementation of this decision is being delayed due to interdepartmental barriers.

The waste-free technology of producing titanium and magnesium, which was developed with the participation of our scientists, as well as the technology of processing vanadium concentrates have shown themselves to advantage. The scientific principles and technologies of the complete processing of the cinders and the recovery of the ashes from the combustion of Ekibastuz coals are being developed. A technology of the processing of substandard bauxites has been introduced at the Pavlodar Aluminum Plant.

The system developed by seismologists of the automatic shutdown of electric power plants, which are located in regions of high seismicity, is of practical interest. The introduction of this system is already being carried out at a number of facilities.

The implementation of the policy of science of all-round intensification requires of scientists particular attention to the problems of machine building, ferrous metallurgy, fuel and power complexes, the chemical industry, and environmental protection. The department of machine building, which has a number of original developments based on mechanisms of high classes, has been established under the Institute of Mathematics and Mechanics of the Kazakh SSR Academy of Sciences.

I should note that some work is being performed on the strengthening of ties with institutes of the Eastern Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin, the republic Ministry of Health, and the republic Ministry of Public Education.

Permit me to describe briefly our basic tasks in the area of the priority directions of research—first of all in ecology. Comprehensive ecological research has become very necessary for many regions of the republic (both those of new development and those that have been under development for a long time), which have become zones of ecological distress or ecological strain. These are the Aral Sea region, the Lake Balkhash region, the Caspian Sea region, Ekibastuz, and the industrial centers of Kazakhstan. It is difficult to name regions of the republic, which do not need ecological protection. It is time to raise legislatively the issue that no economic facility would be built on the territory of the Kazakh SSR without a scientific ecological evaluation of the Kazakh

SSR Academy of Sciences. For the concentration of efforts and the coordination of research in this direction the Ecology Center was established under the Institute of Hydrogeology and Hydrophysics imeni U.A. Akhmedsafin of the Kazakh SSR Academy of Sciences. The concept of the program of scientific research in the area of ecology and environmental protection of the Kazakh SSR for the period to 2015 was formulated and approved jointly with the Kazakh SSR State Committee for the Protection of Nature. A comprehensive program of ecology is now being drawn up on the basis of this concept. The Academy of Sciences should become the center of ecological science and the coordinator of the ecological movement.

The Ecology Center jointly with the departments of sciences need to set up the effective coordination of ecological research within the republic. To begin immediately the elaboration of the scientific basis of ecological monitoring and on its basis to achieve the creation of a bank of ecological data. Mathematical methods, which are the only means for describing and predicting the ecological situation in all its diversity, are being introduced slowly in the study of ecological processes.

In general the questions of the use of mathematical simulation in our research require special examination, since the organization of mathematical simulation and the computer experiment at institutions of the Kazakh SSR Academy of Sciences with respect to their breadth, support, and return is giving rise to serious apprehensions. In addition to the poor organization of work and the shortage of skilled personnel and computer hardware the underestimation of the role of mathematical simulation on the part of many executives of scientific research institutes and their lack of psychological and professional preparation for the radical updating of the methodological arsenal are also having an effect.

The study of the problems of the comprehensive development and use of mineral resources was begun back by the first president of our academy, Academician K.I. Saptayev. The formulation and coordination of a goal program of scientific research for 1991-2000 are being completed for the concentration of scientific forces in the indicated area of research. The functions of the head organization for the problem have been assigned to the Council for the Study of Productive Forces of the Kazakh SSR Academy of Sciences. In this connection in the immediate future it is planned to examine and specify the basic directions of the activity and the structure of the Council for the Study of Productive Forces.

Major tasks, which are connected with the elaboration of sound recommendations on the efficient location of large facilities and the development of the productive forces of the Kazakh SSR, face the academy. These tasks should be accomplished in the shortest time.

Groups of our leading scientists visited a number of oblasts of the republic and familiarized themselves with

the state and development of science and productive forces in the regions. A field meeting of the Presidium of the Kazakh SSR Academy of Sciences, at which the problems facing science with regard to the further comprehensive development of the productive forces of Central Kazakhstan were discussed, was held in Karaganda. There is planned in September-October of this year a field session of the General Assembly in Guryev, at which the problems of Western Kazakhstan will be discussed. The other regions will also not be ignored.

The successful elaboration of the problems of ecology and the complete use of mineral resources is closely connected with the forthcoming changeover of the republic to regional cost accounting and self-financing. Scientifically substantiated recommendations on management and the organization of regional cost accounting are necessary. Unfortunately, our economics scholars proved to be insufficiently ready for such a responsible assignment and insufficiently ready to prepare promptly proposals on the changeover of the republic to the new conditions of economic management and on questions of the development of commodity-money relations, wholesale trade, and the formation of the socialist market, which would be conducive to the establishment of mutually advantageous interregional ties.

The changeover to the new methods of management has aggravated socioeconomic problems. Not only are former problems getting in the way, but new ones, which we did not yet know how to approach, appeared. The simultaneous increase of the monetary income of the population, the cost accounting funds of enterprises, and the outlays of the budget without the corresponding or leading increase of the production of industrial and consumer goods is leading to the intensification of inflationary processes. Such a situation makes it incumbent to set for economics scholars as an extremely important task the elaboration of specific recommendations for directive and planning organs and enterprises of Kazakhstan with a forecast of the development of certain economic phenomena or processes.

From what has been said it follows that our contribution to the processes of restructuring, the acceleration of scientific and technical progress, and basic economic reform, which are occurring in the republic, is still inadequate and requires a substantial increase.

A few words about introduction. To this day the practice of including themes in the plans of scientific research work without the conducting of patent research exists at the Kazakh SSR Academy of Sciences. Therefore, the technical level of many of our scientific developments often does not correspond to the level of world standards. Hence both the small number of highly efficient works, which are being implemented in the national economy and are being patented abroad, and the weak commercial interest in them on the part of foreign firms.

Many of our applied developments in practice are not ready for use and are incomplete, since experimental design studies are not being conducted on them and there are no prototypes of equipment or test batches of products. Today it is impossible to count on successful work on introduction without using advanced forms and methods of the integration of science and production. It is necessary to agree more boldly to contacts with introducing firms and scientific and technical cooperatives, taking advantage of their opportunities for the assimilation of our developments.

Much work has been done at the academy on the preparation for the changeover to the new system of the planning and financing of scientific research work and on the revision, specification, and formulation in this connection of the subject matter of research, which should include themes of three levels:

- those which are being included by agreement in all-union programs of the Presidium and departments of the USSR Academy of Sciences;
- those which are being proposed for elaboration within republic (regional) programs;
- research of a basic, exploratory nature.

The work on the reform of personnel policy was stepped up significantly, the improvement of the structure of scientific institutions was continued. In essence, by today's work on the increase of the personnel potential and the selection and training of scientific personnel we are laying the foundations of the effectiveness of research of the academy in the near future.

While speaking about personnel policy, it should be noted that the speech of First Secretary of the Kazakh CP Central Committee K.V. Kolbin at the last annual session played a large role in the restructuring of the management staff, which is being carried out. The Presidium began restructuring at the academy with itself, having revised the structure and manning table of its staff. The leadership of the Presidium and a number of its departments was changed, four new academician secretaries of departments were elected. The directors of 13 institutes were elected on a democratic basis; their average age in recent times has decreased from 58.5 to 54.

"The Basic Provisions on the Formulation of the Long-Term (to 2005) Comprehensive Program 'Personnel' of the Kazakh SSR Academy of Sciences" were drawn up, the adjustment of the plans of the training of personnel of the highest skill was carried out. We are placing great hopes for the replenishment and the reduction of the age of the members of the academy in the coming election. It is gratifying that a large number of candidates have already now been nominated for the announced vacancies, which will make it possible to elect truly talented energetic scientists as members of the academy.

The development of new advanced forms of the organization of scientific research is becoming a more and more important direction of the activity of the academy.

During the year under review three scientific centers, the Khimiko-tehnologicheskii and Kibernetika scientific technical complexes, and three educational production associations were set up under institutes. The Institute of Chemical Sciences of the Kazakh SSR Academy of Sciences became a part of the Membrany Interbranch Scientific Technical Complex.

The material and technical base of our academy of sciences is, perhaps, one of its weakest links. It must be stated that, in spite of the assistance of the union academy and the republic Council of Ministers, in no way can we eliminate the lag in the strengthening of the material base. As in preceding years, extremely insufficient plantwide equipment and instruments are being allocated. The level of supply of computer hardware cannot meet either quantitatively or qualitatively the increasing needs of academic institutions for advanced means of calculation and the automation of scientific research. And we do not always use the available hardware and equipment efficiently. At institutes on 1 January 1989 there were uninstalled equipment worth 1.3 million rubles and above-standard stocks of materials worth more than 300,000 rubles.

Major shortcomings also exist in capital construction. With a plan of 8.8 million rubles 6.6 million rubles of capital investments, or 75.5 percent, were assimilated. The poor organization of work at facilities on the part of contracting organizations and our capital construction department was the basis cause of the upsetting of the plan of capital construction for the Kazakh SSR Academy of Sciences. Now owing to the vigorous assistance of the republic Council of Ministers the situation is improving. The Presidium is taking urgent, effective steps on the elimination of shortcomings and the implementation of decisions of directive organs in the area of the material and technical supply of institutions of the Kazakh SSR Academy of Sciences. The improvement of the social sphere is also envisaged. The construction of the 100-room Zerde Dispensary along Prospekt Lenina is now being completed. A 160-seat dining room will be built.

Concluding my opening address, permit me on your behalf to express to the Kazakh CP Central Committee, the Presidium of the Supreme Soviet, and the Kazakh SSR Council of Ministers our gratitude for daily attention to the Academy of Sciences and constant concern for the development of science in the republic and to express confidence that the scientists of the academy will exert every effort for the successful accomplishment of the problems and tasks, which have been set for them.

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Report on Organizational Activity

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KAZAKHSKOY SSR in Russian No 7, Jul 89 pp 31-39

[Speech by Corresponding Member of the Kazakh SSR Academy of Sciences V. N. Okolovich, chief scientific secretary of the Presidium of the Kazakh SSR Academy of Sciences, at the session of the General Assembly of the Kazakh SSR Academy of Sciences on 26 April 1989, under the rubric "The Session of the General Assembly of the Kazakh SSR Academy of Sciences": "The Basic Results of the Work of the Academy of Sciences on the Improvement of Scientific and Scientific Organizational Work"]

[Text] Today our country is going through a critical period of its development. Restructuring in the social and economic areas has affected practically all spheres of our life and has required that the state of affairs in science also be looked at in a new way. "The basic course of restructuring in science," President of the USSR Academy of Sciences Academician G.I. Marchuk noted, "should consist in the unity of fundamental structural reforms and the democratization of all aspects of the life of the scientific community" (PRAVDA, 7 March 1989). How is our Kazakhstan science, particularly academic science, participating in this process?

The report on the activity of the Academy of Sciences in 1988 has been published and all the members of the academy have it. The results of the scientific and scientific organizational activity of institutes were examined at the sessions of the general assemblies of the departments.

Today we heard the opening address of Academy President U.M. Sultangazin and the reports of Vice Presidents A.A. Abdulin and Zh.M. Abdildin on the basic results of the activity of the Kazakh SSR Academy of Sciences. Permit me to present the basic results with respect to the improvement of the scientific and scientific organizational work of the academy during 1988 and to give an analysis of the measures on the increase of the efficiency of the work of the academy and its subdivisions, which were outlined and implemented by the Presidium and its departments and institutes.

The Presidium devoted particular attention in its work to the fulfillment of the decree of the Presidium of the USSR Academy of Sciences "On Steps on the Increase of the Effectiveness of the Scientific Research and the Strengthening of the Material Base of the Kazakh SSR Academy of Sciences," which was adopted in connection with the serious remarks that were recorded by a commission of the Party Control Committee attached to the CPSU Central Committee, and the decision of the conference with Chairman of the Kazakh SSR Council of Ministers N.A. Nazarbayev on the strengthening of the material and technical base of the academy. The criticism, which was heard in the speech of First Secretary of the Kazakh CP Central Committee G.V. Kolbin at the

April session of the General Assembly, and the tasks following from it were also an object of our close attention.

A session of the General Assembly of the academy, at which Academy President Academician of the Kazakh SSR Academy of Sciences U.M. Sultangazin delivered the report "On the Tasks of the Kazakh SSR Academy of Sciences in Light of the Decisions of the 19th All-Union Party Congress," was held in November 1988. In the report and statements the strategic policy of the republic academy in the accomplishment of the tasks, which follow from the decisions of the party conference, in the immediate future was discussed. In all 3 sessions of the General Assembly of the Kazakh SSR Academy of Sciences and 20 meetings of the Presidium, at which 189 decrees were adopted, were held in 1988. The basic questions, which were at the center of attention of the work of the Presidium during the period under review, are the following:

1. The formulation of scientific themes on a new financial basis, the determination of the priorities in development of some directions of science or others.
2. The development of new advanced forms of the organization of research and the introduction of completed developments in production.
3. The strengthening of the material and technical base of the academy.
4. The settlement of questions of the new personnel policy for the current period and for the future.
5. Questions of the style and methods of scientific organizational work on a democratic basis.

Permit me to dwell on these questions in greater detail.

The formulation of scientific themes and the changeover to new methods of financing were connected with the determination of the priority directions of science, with the revision of the themes of scientific work, and with participation on a competitive basis in 18 all-union state programs of basic research of the USSR Academy of Sciences, which provided additional financing in the amount of 5.7 million rubles. It should be noted that nearly all the themes submitted by us stood up to the all-union competition.

Work was performed on the formulation of research themes for 1989 under the new conditions of theme-by-theme financing in accordance with the following levels: 30 percent—for works of the all-union level, 40 percent—for regional programs, and 30 percent—for exploratory themes. Here the final decision on the distribution of assets belonged to the Scientific Council of the institute on the basis of the competitive selection of projects.

For the first time at our academy the thematic plan of exploratory and regional scientific research work was formulated on a competitive basis; moreover, four

academy programs: "The Ecology of Kazakhstan," "The Efficient Use of the Mineral Raw Materials of Kazakhstan," "Man, Science, Society," and "Information Science" were formulated and received financing in the amount of 4.3 million rubles. Creative competition is the refraction of the process of democratization in the sphere of scientific research.

The more active participation of academic institutes in research on the Ili-Balkhash and Aral problems and the Caspian Sea petroleum and gas region is envisaged when formulating republic programs on the complete use of mineral raw materials and resource conservation. The possibilities of resource-saving technologies are so great that they can substantially change the structure of modern production. Today many technological breakthroughs already exist in the area of resource-saving technologies and ecologically clean works. For our republic these questions are especially urgent. In connection with this academic institutes should direct particular attention to the ecological evaluation, the importance of which was emphasized at the 19th All-Union Party Conference and during the period of the election campaign.

The Presidium is attaching great importance to questions of ecology. The Ecology Center, which was established on the basis of the Institute of Hydrogeology and Hydrophysics imeni U.M. Akhmedsavin, actively engaged in the formulation of the republic ecology program on the basis of a concept, which was approved by the Presidium of the academy and the Kazakh SSR State Committee for the Protection of Nature. The Academy of Sciences began the formulation of a draft of the long-range state program of Alma-Ata "Ecology-2005." A meeting of scientists and specialists in the city party committee, at which the basic directions of ecological research on the improvement of the environment of the republic capital were discussed, was held on 26 April 1988. Round-table meetings, which were organized by the newspaper VECHERNYAYA ALMA-ATA, television, and radio, were held. The city interdepartmental seminar "Scientific Problems of Ecology," which is headed by the president of our academy and in the work of which leading scientists and specialists of the city are participating, was established and is operating successfully. Questions of ecology were discussed at the conference of the presidents of the academies of sciences of the republics of Central Asia and Kazakhstan in October 1988. In all 12 institutes of the academy participated in the republic goal program "Preventive Measures."

One of the basic questions, to which particular attention was devoted, is the organization of new advanced forms of research. In connection with this new structural subdivisions and temporary creative collectives, of which at present there are 24, were formed in a number of priority directions of science. On the level of the introduction of effective forms of the organization of science the academy established three centers: for national and interethnic relations, for sociological problems, and for

ecological problems, three educational scientific production associations, and a machine building department and approved specific plans of the formation in 1989-1990 of the Khimiko-metallurgicheskii and Kibernetika scientific technical complexes; the study of the establishment of another three scientific technical complexes is being carried out.

By way of preparation for the opening of the Physical Technical Institute a physical technical department was formed in the structure of the Institute of High Energy Physics of the Kazakh SSR Academy of Sciences. The basic directions of the practical scientific work of the State Agroindustrial Committee and the academy on the organization of the Kazakh Interbranch Center for the Receiving and Processing of Space Information within the Kibernetika Scientific Technical Complex were specified. The Produkt gamma-irradiation complex, which is intended for the reduction of losses during the storage of potatoes, vegetables, and other food products, is being established jointly with the Kazakh SSR State Agroindustrial Committee.

We are often reproached with the inadequate coordinating role of the Academy of Sciences and the weak ties of science with production. While accepting this criticism, I would like to note that in part the situation was complicated by the reorganization of a number of ministries and the transfer of republic programs to sectors. In spite of this, the academy conducted research and is carrying out coordination for all the programs, in which it is the head, including such programs as "The Air Basin," "Corrosion," and "Heliobiotherm."

We have with higher educational institutions a plan of joint work for 1985-1990, which includes 45 jobs. Moreover, scientific councils are coordinating about 500 themes that are being carried out by higher educational institutions. But the cited figures are not an indicator of the coordinating role of the academy. It is possible to solve this problem, in our opinion, in only one way—to secure the coordinating role of the academy by directive, as was done at the Ukrainian SSR Academy of Sciences.

We understand perfectly that the main task of restructuring in science is the achievement of the highest, international scientific level and a leading position in the priority areas of basic science and the integration of science with production. And today we are faced more often than ever with the question of how the level of our research compares with the union and world levels.

Leading scientists and scientologists believe that the organization of science in the state should be based on three main questions: the choice of priority directions, the formation of major scientific programs, and expert evaluation. Whereas we are dealing in earnest and rather successfully with the first two questions, the expert evaluation of our scientific achievements in accordance with international criteria is for the present vain wishes. This matter is difficult and responsible, and we need to have reliable criteria of the evaluation of scientific

achievements, otherwise it will be difficult to distinguish what is desirable from what is real, and we will spend our assets in vain on scientific research, which long ago lost its topicality and significance. We are relying on assistance of the Council for the Study of Productive Forces of the Kazakh SSR Academy of Sciences in this matter.

Today ties with leading scientific institutions of the Union and international cooperation are one of the indicators which determine the level of our science.

At present 22 institutes of the Academy of Sciences are performing joint work on 65 themes with scientific institutions of 7 socialist countries. The holding on the basis of scientific institutions of the Kazakh SSR Academy of Sciences of conferences, symposiums, and meetings, in which scientists and specialists of CEMA member countries, the FRG, the United States, Canada, Brazil, Switzerland, India, and other countries took part, contributed to the strengthening of international cooperation. Our leading scientists were invited to give lectures and deliver custom-made reports at universities and scientific centers of Japan, the FRG, England, Canada, Poland, and the GDR. In 1988, 137 specialists went on foreign business trips to participate in conferences, symposiums, and meetings. Here scientists of our academy delivered more than 80 reports.

It is difficult to name any other question, to which so much attention would be devoted by directive organs, as invention and patent and license work. And this is not surprising, since the use of scientific results in practice is often the main criterion when evaluating scientific activity.

In 1988 scientific institutions of the Kazakh SSR Academy of Sciences submitted to the USSR State Committee for Inventions and Discoveries 2 applications for an invention and 435 applications for prospective inventions. In accordance with applications of past years 247 inventor's certificates and 263 positive decisions were issued. The percentage of the issuing of positive decisions is 64, the average for the Union is 54. Three patents and three positive decisions on their issuing were received from foreign patent departments.

The number of scientific institutions of the Kazakh SSR Academy of Sciences, which are engaging in the patenting of inventions abroad, increased. In 1988 in accordance with proposals of the Academy of Sciences 8 objects, which contain 10 inventions, including developments of the institutes of nuclear physics, soil science, chemical sciences, organic synthesis, and coal chemistry, were accepted for patenting.

For the purpose of the commercial sale abroad of inventions, which were developed at the Kazakh SSR Academy of Sciences, 21 developments were included in the plan of joint measures with the Litsenzintorg All-Union Association, which conveyed to interested foreign firms of Bulgaria and the CSSR commercial proposals for developments of the Institute of Metallurgy and Ore Dressing of the Kazakh SSR Academy of Sciences. This

institute opened a foreign currency account at the USSR Foreign Trade Bank, to which currency receipts were transferred from the Snamprogetti firm (Italy) in accordance with a license agreement.

In 1988, 95 inventions were used in various sectors of the national economy with a total economic impact of 4.54 million rubles. In the search for new forms of cooperation a meeting of inventors of scientific institutions of the Kazakh SSR Academy of Sciences with executives of industrial enterprises of Alma-Ata was organized on the initiative of the academy and the oblast council of the All-Union Society of Inventors and Efficiency Experts. Scientists proposed to introduce the most interesting inventions on the purification of the air basin of the city and sewage, the anticorrosion coating of pipes of the central heating plant, and the lighting of city streets. Developments of scientists were also displayed at the Trade Fair of Ideas, which was held by the Alma-Ata Oblast Council of the All-Union Society of Inventors and Efficiency Experts and the Kazakh Scientific Research Institute of Scientific and Technical Information.

And still the poor use of scientific and technical achievements is not only the fault of scientists, but also a result of the fact that our production was "unreceptive to science." Thus, only 6 oblast soviet executive committees and 10 organizations responded to the request made by the Academy of Sciences to 40 ministries, large administrations, enterprises, and organizations of 17 oblast soviet executive committees to provide suggestions on joint development or research in the interests of the oblast, region, and enterprise. Until production is interested in the constant introduction of scientific achievements, the efforts of scientists will remain in many cases a futile expenditure of the intellectual potential with meager results.

In the opinion of some specialists, there should be 10 units of expenditures on experimental design work and tests of new equipment and technology per unit of expenditures on scientific research. However, it is well known what a serious obstacle in the way of the assimilation of new advanced developments the weak pilot experimental base and the lack of proper instrument supply are. The Kazakh Academy of Sciences holds one of the last places with respect to this indicator. According to the data of the Council for the Study of Productive Forces of the Kazakh SSR Academy of Sciences, the gap in the capital-labor ratio as compared with the average union indicator has now reached 20 percent. Special steps and large one-time allocations of capital investments and assets for the technical equipment of academic science are needed in order to overcome it. The Presidium took the most active steps to settle these questions. Repeated meetings of the leadership of the Presidium of the USSR Academy of Sciences and the Central Supply Administration of the USSR Academy of Sciences made it possible to make progress in this matter already in 1988 and in the immediate future. A YeS-1066 computer was allocated to the academy, there are hopes for obtaining a YeS-1046 machine and computers,

the question of modules is being decided. At the same time in connection with the complication of this problem for the country as a whole we have to seek direct contacts both with foreign firms and within the country. The conclusion by six of our institutes of direct contracts with a number of socialist countries and the further stimulation of this work will, perhaps, make it possible to improve somehow the supply of academic institutions with instruments and reagents.

The situation with the pilot experimental base of the Institute of Metallurgy and Ore Dressing and with the pool of machine tools is improving. At present all the production areas are occupied.

On the basis of a decree of the Presidium of the Kazakh SSR Academy of Sciences and the Kazakh SSR Ministry of Public Education the Energotekhnologicheskiiye vysokotemperaturnyye protsessy Engineering Center for the development of new plasma technologies was established at the pilot experimental metallurgical works. Here it should be noted that the questions of the organization of a Collective-Use Center, the more efficient use of available single-design instruments by means of their two-shift operation, the timely placement of new instruments into operation, and their high-quality metrological service and checking are being settled extremely slowly. We hope that the department of the Interatominstrument International Economic Association, which was established in Alma-Ata, will help in solving these problems. It is necessary to point out that on 1 January 1989 in the system of the academy there were still uninstalled and unused equipment and instruments worth about 2 million rubles.

Proceeding to the question of capital construction, it must be stated that, like a year ago, in 1988 this question was worked on unsatisfactorily.

It was envisaged by the plan of the economic and social development of the Kazakh SSR Academy of Sciences for 1988 to assimilate 8,837,000 rubles of capital investments. In fact 6,669,000 rubles (75.5 percent of the plan) were assimilated. With respect to construction and installation work the plan was fulfilled by 65.9 percent. The Presidium is taking urgent, effective steps on the settlement of the questions of the economic and social development of the academy, and there are already changes for the better.

The accomplishment of the tasks of science, which found concentrated expression in the materials of the 27th CPSU Congress, requires both more advanced organizational forms and a more flexible personnel policy.

A most important direction of the work of the Presidium on the restructuring of the activity of the academy is the improvement of its personnel policy. First of all this is the actively continuing process of replacing the management personnel of all levels with new personnel. The overall direction of the changes, which are already being implemented, is the substantial decentralization of management, that is, the elimination of the combining of

management positions, the electivity of directors of institutes and their deputies, and the increase of the role of departments and scientific councils of institutes.

Substantial changes took place in the composition of management personnel. Of the former staff of the Presidium 10 members (52.7 percent) left, 4 members of the Presidium were newly elected. The average age of the members of the Presidium decreased by 4 years. In all 4 academicians secretaries of departments, 18 directors (56.3 percent) of scientific research institutes, 32 deputy directors for science (75 percent), and about a third of the managers of scientific subdivisions were replaced. The positions of advisors of the Presidium and directors were introduced. Five members of the academy were appointed to the positions of advisors.

The increase of the personnel potential and the selection, training, and placement of personnel were key questions of the restructuring of the activity of the academy during the past year.

For the purpose of tightening up the coordination of the programs and plans of scientific research work, which are being formulated, with the assignments on their manpower supply the draft of a plan of the training of scientific personnel through institutions of the Academy of Sciences for the 13th Five-Year Plan was drawn up. The "Personnel" program, in which a block of the systems training of doctors and candidates of sciences to 2005 is envisaged, should make its contribution to the solution of this problem. Doctoral studies in four specialties were launched at four institutes.

During the past year the question of training scientific personnel through graduate studies was heard three times at meetings of the Presidium. The attention of the boards of directors of institutes and scientific supervisors was directed to the low efficiency of the work with graduate students and degree seekers, it was proposed to devote more attention to the certification of graduate students and to take steps on increasing the responsibility of graduate students themselves and their scientific supervisors.

In 1988, 140 people (with a plan of 133) were admitted to graduate studies of the Academy of Sciences; this includes 23 people who were admitted to special graduate studies. In all 16 associates with a special appointment were sent to central scientific research institutes. A total of 113 people completed graduate studies of the academy and 20 completed graduate studies of central scientific research institutes. In all 21 doctoral dissertations and 136 candidate dissertations were defended.

The high-quality completion of graduate studies comes to 46 percent, including 11 percent with the defense of a dissertation. With respect to this indicator we are in second place after the Belorussian Academy of Sciences (47.3 percent) (for example, the high-quality completion of graduate studies of the Armenian SSR Academy of Sciences comes to 23.4 percent, the Uzbek SSR Academy of Sciences—31.5 percent, and the Ukrainian SSR

Academy of Sciences—34.3 percent). But we still have many shortcomings and unused possibilities in the matter of training personnel, and the quantitative and, what is the main thing, qualitative indicators will depend first of all on the attitude of the management of institutes and leading scientists toward the question of personnel training. It must be remembered that that this is our duty, our obligation, and we should be concerned about the future of science. It is necessary to more actively identify and attract to our institutions the most capable young people, who have been trained since school days for scientific work. We hope that the 18 affiliates of chairs of higher educational institutions, which are operating at institutes of the Academy of Sciences, are one of the means of solving this problem.

The Small Academy of Sciences, which unites 10 departments, including 3 oblast departments: Tselinograd, Kustanay, and Leninsk, is performing much work on the broadening of the scientific outlook of school children and in the acquisition by them of the skills of creative and scientific research work. It is performing extremely needed work, but, unfortunately, not all the departments of the Presidium are giving it effective assistance. Attaching great importance to the participation of young people in the accomplishment of the tasks facing science, the leadership of the academy headed by the president repeatedly met with young scientists, discussing the various problems that are interfering with their creative growth. A commission made up of leading scientists of the academy for work with young scientists was established, and I want to express the wish of its members to the Council of Young Scientists and its chairman: be more active in the search for new forms of work with young people and remember that the basic goal of the work of the Council is the identification among young scientists of the most talented representatives and the giving of assistance to them in their formation as scientists.

Collectivity in the settlement of major questions, glasnost, and democracy were at the basis of all the activity of the Presidium, departments, and boards of directors of institutes during the past year.

The leadership of the academy visited practically all the scientific subdivisions and departments and held field meetings of the bureau at institutes or expanded meetings with the involvement of all the members of the department in the discussion of questions and with the establishment of commissions for the analysis of the state of affairs locally. In this connection the discussion of the reports of institutes in the bureaus of the departments and of the departments in the Presidium on the results of 1988 was of a critical nature, where a serious analysis was made and recommendations on the improvement of the work were given on the part of expert commissions made up from among the leading scientists of the academy, who do not work in the academic system. The elections of directors of institutes were conducted on a new democratic basis.

The nomination of members of the academy for the coming election only through the departments, in conformity with the change that was made in the Charter of the Kazakh SSR Academy of Sciences, is one of the factors of democratization in the settlement of the most important questions. We succeeded to some extent in overcoming the inertia of stagnation in our work. The prerequisites were created to improve significantly already in the immediate future the work of the academy as a whole, but all the same serious shortcomings and oversights still exist in our work. Thus, the level of the held meetings of the Presidium has to be raised, questions of the development of new directions of science have to be submitted more often for discussion; an atmosphere of discussions and an objective businesslike conversation has to be created when listening to scientific reports. The scientific work of individual institutes is extremely rarely a topic of consideration in the Presidium, since an in-depth study and comprehensive checking with subsequent specific proposals on the correction of shortcomings should precede this.

In recent times the question of low performer discipline has often arisen. Thus, the check of the fulfillment of the decrees of the Presidium of the Kazakh SSR Academy of Sciences, which were adopted in 1988, revealed a low coefficient of expedition by responsible officials at all levels. Of the 189 decrees of the Presidium 80 were taken under control, of them only 25 (62 percent) were completely fulfilled.

For the purpose of improving performer discipline steps were taken on the increase of the demands on performers and their responsibility; Statutes on the Preparation of Questions and the Organization of Meetings of the Presidium and the Monitoring of the Fulfillment of Decrees and Orders were drafted.

For the improvement of the scientific organizational work of the academy a new structure of the central apparatus of the Presidium was approved. The Council for Coordination and Planning, the Council for Introduction, and the scientific organizational department were included in it. The replacement of the management of the majority of subdivisions of the Presidium was carried out, highly skilled specialists became the leaders of their work.

As a result of successful work on the fulfillment of the assignments of the 12th Five-Year Plan the collective of the Institute of Mathematics and Mechanics of the Kazakh SSR Academy of Sciences was awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Trade Unions, and the All-Union Komsomol Central Committee.

Commending the achievements in scientific and scientific organizational activity and the successful fulfillment of the adopted socialist obligations and the plans of scientific research work and introduction, the Presidium of the Kazakh SSR Academy of Sciences of mining,

botany, microbiology and virology, experimental biology, chemistry and metallurgy, linguistics, and economics.

At present science and scientists have become a subject of "special attention" of managers of different ranks, writers, and journalists. It is possible to dispute how just the reproaches meant for scientists are, but it is impossible not to admit that science actually needs new organizational structures. In many reports and decrees, which concern the organization and development of science, it is often imagined in a very simplified manner that it is sufficient to concentrate the efforts of scientists on the main promising directions, to eliminate duplication in some fields and to ensure competition in others, and to increase the efficiency of the labor of scientists, and everything else will come of its own accord. But life dictates its own way: neither appeals nor pressures are effective as a norm of everyday scientific organization. It is time in seeking organizational forms to proceed from the real stimuli and motives, which drive the scientist in his creative activity.

We should try to support the new forms of the organization of labor, which are connected first of all with the human factor, which has the most significant reserves, on the basis of the following basic stimuli that govern the development of science:

- 1) natural intellectual curiosity and the thirst to study the truth;
- 2) the scientist's own self-affirmation and public recognition, which everyone needs;
- 3) material interest. Given the present system of remuneration young scientific personnel with families, as a rule, fall under the power of the material stimulus, the long-term influence of which cannot but suppress the "more noble" motives of their creative activity.

The deep meaning of restructuring also consists in the fact that the party has appealed directly to human moral principles, which in the recent past were frequently ignored, or else suppressed. It is very difficult to accomplish everything stated in specific proposals, but we should work on this, otherwise we will also take a back seat to world science in the remaining scientific directions, in which the academy has not lost leading positions.

Setting as a goal the gradual improvement of the system of territorial management in conformity with the basic principle of Soviet federalism—a strong center and strong republics, in the draft of "The Basic Principles of the Management of the Economy and Social Sphere in the Union Republics" it is noted that the republics themselves elaborate and implement steps on the pursuit of scientific and technical policy, the increase of the quality of scientific research, and the improvement of the organization of science and scientific service, taking into account the regional peculiarities of the development of productive forces.

Thus, the subsequent fate of science of our republic and its scientific and technical potential will depend on the initiative of sciences. We are obliged to remember this constantly.

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Decree Passed at General Assembly

18140321 Alma-Ata VESTNIK AKADEMII NAUK
KAZAKHSKOY SSR in Russian No 7, Jul 89 pp 68-73

[Decree of the Session of the General Assembly of the Kazakh SSR Academy of Sciences of 26 April 1989, under the rubric "The Session of the General Assembly of the Kazakh SSR Academy of Sciences": "On the Results of the Work of the Kazakh SSR Academy of Sciences in 1988 and the Prospects of the Further Development of Scientific Research"]

[Text] The General Assembly of the Kazakh SSR Academy of Sciences, having discussed the statements of President of the Academy of Sciences and Academician of the Kazakh SSR Academy of Sciences U.M. Sultan-gazin, Vice Presidents and Academicians of the Kazakh SSR Academy of Sciences A.A. Abdulin and Zh.M. Abdildin, and Chief Scientific Secretary and Corresponding Member of the Kazakh SSR Academy of Sciences V.N. Okolovich, notes that the scientists of the Kazakh SSR Academy of Sciences concentrated all their creative efforts on the intensification of the process of the restructuring of scientific and scientific organizational activity in light of the decisions of the 19th All-Union Party Conference, on the elimination of the shortcomings that were noted by the commission of the Party Cnd Zh.M. Abdildin, and Chief Scientific Secretary and Corresponding Member of the Kazakh SSR Academy of Sciences V.N. Okolovich, notes that the scientists of the Kazakh SSR Academy of Sciences concentrated all their creative efforts on the intensification of the process of the restructuring of scientific and scientific organizational activity in light of the decisions of the 19th All-Union Party Conference, on the elimination of the shortcomings that were noted by the commission of the Party Control Committee attached to the CPSU Central Committee, and on the implementation of the decisions of the Kazakh SSR Council of Ministers with respect to the report of the Academy of Sciences for 1987 and the decree of the Presidium of the USSR Academy of Sciences.

With allowance made for these tasks the activity of the Presidium, the departments, and scientific institutions was focused, first of all, on the formulation of scientific themes on a new financial basis; the coordination of the themes with the all-union state programs of basic research of the USSR Academy of Sciences; the development of new advanced forms of the organization of research and the introduction of completed developments in production; the settlement of questions of

personnel policy. All these tasks were fulfilled on the basis of democratization and glasnost.

Much, fundamentally important work was performed on the revision of themes, their coordination, and their inclusion in 18 statewide programs of basic research of the USSR Academy of Sciences, which provided additional financing in the amount of 5.7 million rubles. Practically all the submitted themes stood up to all-union competition.

The thematic plan of the work of scientific institutions was formulated for the first time on a competitive basis with the specification of the amount of financing by each individual theme. The scientific themes in priority directions were financed in the full amount. The thematic plan of scientific institutions was strictly coordinated with the special-purpose assignments of directive organs of the country (union themes) and republic directive organs (regional themes) and with the assignments of the Presidium of the Kazakh SSR Academy of Sciences and the initiative of scientific institutions (exploratory themes). Four academic programs: "The Efficient Use of the Mineral Raw Material Resources of Kazakhstan," "The Ecology of Kazakhstan," "Man, Science, Society," and "Information Science," were formulated for the first time on a competitive basis and received financing in the amount of 4.3 million rubles.

On the level of the introduction of efficient forms of the organization of science three centers: for national and interethnic relations, for sociological problems, and for ecological problems, six educational scientific production associations, and a machine building department were opened, the specific plans of the establishment in 1989-1990 of the Khimiko-metallurgicheskii and Kibernetika scientific technical complexes were approved.

By way of preparation for the opening of the Physical Technical Institute the physical technical department was formed in the structure of the Institute of High Energy Physics.

The basic directions of the practical scientific work of the Kazakh SSR State Agroindustrial Committee and the Kazakh SSR Academy of Sciences on the organization of the Kazakh Interbranch Center for the Receiving and Processing of Space Information within the Kibernetika Scientific Technical Complex were specified.

In all 24 scientific structural subdivisions and temporary collectives were organized in a number of priority directions. A total of 18 affiliates of chairs of higher educational institutions are operating at institutes of the academy.

In the area of personnel policy it was deemed necessary to continue the improvement of the formulation of the "Personnel" program with allowance made for the new procedure of financing. Substantial changes occurred in the staff of management personnel. Of the former personnel of the Presidium 10 members (52.7 percent) left, 4 members of the Presidium were newly elected.

In all 4 academician secretaries, 32 deputy directors for science, and about a third of the managers of scientific subdivisions were replaced. In all 13 directors of institutes were selected on a democratic electoral basis. In connection with the attainment of the maximum age nine academicians and seven corresponding members of the Kazakh SSR Academy of Sciences, five doctors of sciences, and three candidates of sciences were relieved of management positions. The positions of advisors of the Presidium and directors were introduced, five members of the academy were appointed to the positions of advisors. The number of scientific associates increased by 23 doctors of sciences and 71 candidates of sciences. Associates of the Academy defended 21 doctoral dissertations and 136 candidate dissertations. Doctoral studies in four specialties were launched at four institutes.

In all 121 young specialists, including 28 who had graduated from leading higher educational institutions of the country, were assigned to institutes. For the improvement of skills 23 scientific associates were attached to central institutes of the country.

In all 140 people were admitted to graduate studies with a plan of 133, 113 graduate students finished up, including 52 or 46 percent with their defense on time or with the submitting of their work, which is slightly less than last year.

Collectivity in the settlement of major questions, glasnost, and democracy were made the basis of the activity of the Presidium, the departments, and the boards of directors of institutes. The leadership of the academy visited practically all the scientific subdivisions. The departments held field meetings of the bureaus at institutes or expanded meetings of the bureaus with the enlistment of members of the department in the discussion of the results of activity and established commissions for the analysis of the state of affairs locally. The discussion of the reports of the institutes in the bureaus of the departments and of the departments in the Presidium on the results of 1988 was of a critical nature, where a serious analysis was made and recommendations of expert commissions made up of scientists, who are members of the Academy and do not work in the academic system, were given.

As compared with 1987, during the year under review the number of themes being fulfilled decreased from 525 to 480. Among them are 128 themes with respect to 42 all-union scientific and technical programs, 23 of which are on the state record of the USSR Central Statistical Administration, a number of jobs with respect to 10 decrees of the Central Committee and the USSR and Kazakh SSR Councils of Ministers, 55 assignments with respect to 16 republic programs, 7 jobs with respect to the coordinating plans of the Katalizator, Mekhanobr, and Biogen interbranch scientific technical complexes, and 178 themes with respect to the coordinating plans of research in the area of ferrous metallurgy, geology, the Agroindustrial Committee, the Ministry of Health, and the Ministry of Public Education.

Substantial results, which were published in a number of international and union publications, were obtained in 1988 with respect to a number of completed and carried over themes.

In the area of the physical mathematical sciences the coefficient necessary and sufficient terms of the unique solvability of boundary problems for ordinary differential equations were established; it was revealed experimentally that the inelastic interactions of particles with a large transverse momentum are accompanied by an increase of the total number of produced particles; a previously unknown property was established—the independence of the symmetrical and asymmetrical methods of the fission of nuclei in the interval from lead to curium.

Interesting results were obtained by scientists of the chemical technology direction. The structural solution of a technology of obtaining lead and electrochemical methods of the synthesis of new phosphorus-containing derivatives, which have a high antitumor activity, were developed.

Scientists of the Earth Sciences Department identified the new Yuzhnyy Turgay petroleum and gas basin and established the presence of petroleum and gas in the Zaysan Depression; they proposed a method of predicting outbursts of coal and gas when working coal seams of the Karaganda basin.

For the first time in world practice in the field of molecular biology ribonucleoproteins, which contain all the types of low-molecular nuclear ribonucleic acids, were studied on plant objects (dry wheat germs).

In the field of genetic engineering model transgenic tobacco plants were obtained jointly with the Institute of General Genetics of the USSR Academy of Sciences by means of the previously constructed bireplicon agrobacterial vector system. The hordein B₁ gene was inserted in the genome of the tobacco plant under its own promoter.

In the field of the social sciences for the first time in Kazakhstan historiography an integrated approach to the elaboration of difficult questions of the history of Kazakhstan of the second half of the 19th century was implemented, considerable work was performed on the elimination of the "blank spots" of the history of Kazakhstan, the works of Sh. Kudayberdyev were prepared and published, and materials on the creative legacy of Magzhan Zhumabayev, Akhmet Baytursynov, and Zhusupbek Aymautov were studied and submitted to the Kazakh CP Central Committee.

The achievement of the highest, international scientific level and a leading position in priority fields of basic science was and remains the main task of restructuring in science. During the year under review 22 institutes of the Academy of Sciences set up cooperation on 65 themes with scientific institutions of 7 socialist countries, including 12 with respect to the Comprehensive Program of Scientific and Technical Progress of the CEMA

Member Countries, 2 within UNESCO, 2 along the lines of the Committee of the Academies of Sciences of the Socialist Countries for Planetary Geophysics, 40 with respect to plans of bilateral and multilateral cooperation, and 9 within the framework of direct ties.

The institutes of chemical sciences, microbiology and virology, botany, geography, history, archeology and ethnography, and linguistics are among the institutes that concluded direct agreements with scientific institutions of the CSSR, Poland, Hungary, the GDR, and the PRC.

The holding on the basis of scientific institutions of the Kazakh SSR Academy of Sciences of conferences, symposiums, and meetings, in which scientists and specialists of CEMA member countries, the FRG, the United States, Canada, Brazil, Switzerland, India, and other countries took part, contributed to the strengthening of international cooperation.

Leading scientists of the Academy of Sciences were invited to give lectures and deliver custom-made reports at universities and scientific centers of Japan, England, and the GDR. As a whole scientists delivered more than 80 reports.

In 1988 scientific institutions of the Kazakh SSR Academy of Sciences submitted to the USSR State Committee for Inventions and Discoveries 2 applications for an invention and 435 applications for prospective inventions. In accordance with applications of past years 247 inventor's certificates, 263 positive decisions, and 104 rejections were received. Three patents and three positive decisions on their issuing were received from foreign patent departments. For the purpose of the commercial sale of inventions abroad 21 developments were included in the plan of joint measures with the Litsenzintorg All-Union Association.

In 1988, 8 objects, which contain 10 inventions, were proposed for patenting, which is significantly more than in 1987. The best scientific developments were displayed at 7 international, 8 union, and 10 republic scientific and scientific and technical exhibitions.

In the sectors of the national economy 226 scientific developments were introduced with a confirmed economic impact of 11 million rubles.

The awarding of USSR and Kazakh SSR State Prizes and diplomas to a number of scientists of the academy testifies to the level of the research being conducted. For the successful fulfillment of the assignments of the public program on the development and assimilation of the technological process and equipment for the molten pool smelting of copper concentrates the collective of the Institute of Metallurgy and Ore Dressing of the Kazakh SSR Academy of Sciences was awarded the diploma of the All-Union Central Council of Trade Unions and the USSR State Committee for Science and Technology. The USSR State Prize was awarded to Doctor of Technical Sciences I.A. Baytenov and Candidate of Technical

Sciences V.A. Kozlov, associates of this institute, for the development and introduction of resource-saving processes in the production of titanium and magnesium. For the results of comprehensive studies of the territories of Rudnyy Altay Candidate of Geological Mineralogical Sciences A.M. Mysnik, an associate of the Institute of Geological Sciences, was awarded the USSR State Prize.

The Prize of the Kazakh SSR Council of Ministers was awarded to a group of scientists of this institute headed by Corresponding Members of the Kazakh SSR Academy of Sciences S.K. Kalinin and P.T. Tazhibayev for work on the development of a set of physical methods for studying the composition of mineral raw materials and on their introduction in the national economy.

For a basic work that took many years—the 13-volume publication "Flora sporovykh rasteniy" [Flora of Sporophytes]—associates of the Institute of Botany of the Kazakh SSR Academy of Sciences were awarded the Kazakh SSR State Prize in Science and Technology. The 1988 Kazakh SSR State Prize was awarded to linguists for a work that took many years—the 10-volume "Tolkovyy slovar kazakhskogo yazyka" [Explanatory Dictionary of the Kazakh Language].

For the first time one of the institutes of the Academy of Sciences—the Institute of Mathematics and Mechanics—was awarded in accordance with the results of the year the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Trade Unions, and the All-Union Komsomol Central Committee.

In accordance with the results of the socialist competition among scientific institutions of the academy the Institute of Mathematics and Mechanics, the Institute of High Energy Physics, the Order of Labor Red Banner Institute of Metallurgy and Ore Dressing, the Order of Labor Red Banner Institute of Chemical Sciences, the Order of Labor Red Banner Institute of Geological Sciences imeni K.I. Saptayev, the Institute of Mining, the Institute of Botany, the Institute of Microbiology and Virology, the Institute of Experimental Biology, the Chemistry and Metallurgy Institute, the Institute of Economics, and the Institute of Linguistics were the winners.

While rating positively the stepping up of scientific organizational work, mainly at the level of the Presidium of the Kazakh SSR Academy of Sciences, the General Assembly notes that the work being performed by the academy on restructuring as a whole still inadequately conforms to the present requirements. This, first of all, pertains to the creation of the proper pilot experimental and material and technical base of research.

In spite of the conference held by Chairman of the Kazakh SSR Council of Ministers N.A. Nazarbayev and the constant monitoring of the implementation of its decision on the part of the Council of Ministers, big changes did not occur in the pace of the introduction of the developments of scientists, material and technical

supply, and construction. Due to the lack of the necessary documents through the fault of the Capital Construction Administration of the Kazakh SSR Academy of Sciences the start of the construction of a number of facilities during 1988-1989 was disrupted.

The changeover of the Academy as of 1987 to the new procedure of the remuneration of the labor of scientific associates was not used by institutes for the most flexible stimulation of creative labor. The saving of the wage fund as before came to more than 1.2 million rubles. The amount of uninstalled and unused equipment is also not decreasing.

The monitoring on the part of departments and the Interdepartmental Scientific Councils attached to the Presidium of the Kazakh SSR Academy of Sciences of the implementation of the coordinating plans of joint work with ministries and departments and of the holding of joint meetings and sessions of the general assemblies for the discussion of the prospects of elaborating the most important, interdepartmental problems under the conditions of the new economic and legal reforms was relaxed considerably.

The introduction of a portion of the applied jobs is being held up due to the lack of experimental design analyses of them and the production of prototypes of new equipment or test batches of new products.

The departments and institutes do not have thus far concepts of development for the next 10-15 years, which are precisely coordinated with respect to all the parameters (the directions of research, the training of personnel, the organization of new structural subdivisions, the priority tasks of science and practice). The scientific councils for problems are not formulating forecasts of the subsequent development of research, which is assuming particular urgency on the threshold of the formulation of the plans for the 13th Five-Year Plan and in connection with the changed procedure of financing science.

The priority directions of research are being discussed too little at meetings of the Presidium, bureaus of the departments, and sessions of the general assemblies.

The steps being taken on the implementation of the decree of the republic Committee of People's Control in the area of the improvement of the training of scientific personnel through graduate studies have thus far not yielded appreciable results.

The mobilizing and guiding role of the bureaus of the departments and the scientific councils in the formation of themes and the personnel potential, in spite of the legal broadening of the rights of the departments, is inadequate and inefficient. The development of a fundamentally new approach to the role and activity of the scientific councils with allowance made for the changed procedure of planning and financing and the establishment of the Council for Planning and Coordination of the Kazakh SSR Academy of Sciences is necessary.

The General Assembly of the Kazakh SSR Academy of Sciences resolves:

1. To endorse the reports of President of the Academy of Sciences and Academician of the Kazakh SSR Academy of Sciences U.M. Sultangazin, Vice Presidents of the Academy of Sciences and Academicians of the Kazakh SSR Academy of Sciences A.A. Abdulin and Zh.M. Abdildin, and Chief Scientific Secretary and Corresponding Member of the Kazakh SSR Academy of Sciences V.N. Okolovich on the work of the Academy of Sciences in 1988 and to approve the report on the activity of the Academy of Sciences in 1988.
2. The Presidium, departments, and scientific institutions of the Kazakh SSR Academy of Sciences, acting strictly in accordance with the decrees of the Party Control Committee attached to the CPSU Central Committee, the Kazakh CP Central Committee, and the Kazakh SSR Council of Ministers and of the Presidium of the Kazakh SSR Academy of Sciences and the decision of the conference of Chairman of the Kazakh SSR Council of Ministers N.A. Nazarbayev, are:
 - to implement specific measures on implementing the critical remarks that are contained in the named documents and this decree;
 - in connection with the changeover to the new procedure of financing to ensure the primary financing of the priority directions of research, which were approved by the Presidium of the USSR Academy of Sciences in May 1988, having envisaged the broadening of the scale of work within the framework of the programs on the complete use of mineral raw materials, ecology, national and interethnic relations, sociology, and information science;
 - to step up the work on the inclusion of academic developments in State Scientific and Technical Programs, which have been approved by the USSR Council of Ministers, basic research programs of the USSR Academy of Sciences, the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries, and coordinating plans of interbranch scientific technical complexes;
 - to take steps on increasing the readiness of completed scientific works for their practical implementation by the timely completion of experimental design development and the production of prototypes of new equipment or test batches of new products, using for these purposes the potentials of introducing firms and scientific and technical cooperatives, particularly the Ghylym Cooperative attached to the Presidium of the Kazakh SSR Academy of Sciences;

- to complete during the third quarter of this year the elaboration of the concept of the development of each institute and the department of sciences as a whole;
 - to analyze the progress of the implementation of the plan of joint research with ministries and departments of the republic, to outline means of the most effective coordination under the new conditions of work;
 - to practice the preparation and regular submission to directive organs of the republic and country of proposals on the acceleration of scientific and technical progress on the basis of specific, fundamentally new developments of scientists;
 - to discuss regularly at the scientific councils, bureaus, and special sessions of departments, and joint meetings of the Presidium with interested ministries and department the questions of the development of promising directions of science and technology and the introduction of advanced technologies;
 - to ensure the more efficient and effective use of allocated financial assets, scientific instruments, and equipment.
3. The Earth Sciences Department and the Chemical and Technological Sciences Department are to ensure the timely preparation and the conducting at a high scientific level in Guryev of a field session of the Kazakh SSR Academy of Sciences.
- The General Assembly of the Kazakh SSR Academy of Sciences appeals to the entire collective for the speeding up of the process of restructuring in light of the tasks, which were set for Soviet science by the 19th All-Union Party Conference, and for the development of democratization and glasnost, initiative and practical enterprise in order to increase the real effectiveness of research and the contribution of academic science to scientific and technical progress.

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Problems, Prospects of S&T Contract Arrangements

18140315a Moscow NTR: PROBLEMY I RESHENIYA in Russian No 13 (100), 14 Jul 89 pp 4-5

[Interview with Vitaliy Pavlovich Zuyev, deputy general director for economics of the Spektr Scientific Production Association, by NTR: PROBLEMY I RESHENIYA commentator V. Dvoretzkiy under the rubric "The Problem": "Leasing: The Spektr Version"; date and place not given; passages in boldface as published; first two paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] Leasing today is "much rumored about." The maximum possible epithets and eulogies have already been heard, this method of management has already been called a panacea for all our economic defects, and, I believe, it is clear even to the opponents of leasing that without it the usual track (or the track that has been transformed into the usual one) will lead us into a swamp of stagnation. Economists, true, assert that it will lead us not into a swamp, but into an abyss.

Universal loud support of an innovation is not a new thing. Loud, after all, does not yet mean real. Today there are thus far significantly fewer lessees than those who take a close look and estimate: Is it worthwhile to "get mixed up" in this matter? And all the more interesting is the experience of the Spektr Scientific production Association—at present one of the still quite few lessees in science. Our commentator V. Dvoretzkiy talks with V. Zuyev, deputy general director for economics.

NTR: PROBLEMY I RESHENIYA: Vitaliy Pavlovich, in industry unprofitable enterprises were the first lessees. They began an experiment (I have in mind the Butovo Construction Materials Combine), hoping to find economic levers, to press them, and to get away from the edge of "debtors' prison." The experiment was successful. But with what did you approach the introduction of leasing—the organization is still more a scientific one than a production one?

V. P. Zuyev: In the sense of profitability we always lived quite well. And before the changeover to cost accounting in 1988 the scientific subdivisions of the scientific production association performed more than half of the amount of work in accordance with economic contracts. The effectiveness of scientific developments in recent years (in spite of all the imperfection of its calculation) stayed at the level of 3-3.5 rubles per ruble of expenditures.

When the system of cost accounting in science was being developed, we were enlisted in the preparation of state documents on the changeover to cost accounting, and we knew and understood well their basic principles. The new ideas appealed to us, we also saw new horizons both in the improvement of production and in the elimination of leveling in distribution.

NTR: PROBLEMY I RESHENIYA: You introduced the first model of cost accounting, then the second, you have been operating more than half a year now under the conditions of leasing. During this time you solved a large number of problems and gained experience, which, obviously, is interesting and would be very useful for those who have to take your path.

V. P. Zuyev: They will take their own and only their own path. An individual path, as every plant, not to mention science, is specific. That is why I am opposed to the so-called mass introduction of experience. We, after all, became accustomed over long years to reducing everyone to the same level. How did the collective contract work out for N. Travkin in rural construction? Splendidly! Introduce it immediately in the same form in the construction of housing, in industrial construction, in science, and so on! But when fiascoes begin, we blame the method. But precisely our rigidity is to blame. It was necessary to take from Travkin his ideas and principles and to flexibly adapt each plant to them.

NTR: PROBLEMY I RESHENIYA: For you this turned out very well. Therefore, without recommending to the readers to copy the experience as a whole, I would like you to tell about the techniques, methods, and principles, which were developed at the association.

V. P. Zuyev: Then let us begin with the concept of the work of scientific organizations of the scientific production association under the conditions of cost accounting. The concept is based on three principles.

The first. The introduction of contracts (agreements) and contract prices in case of the interaction of subdivisions within the association.

Contracts between subdivisions have become for us (I stress, for us!) a regular stage of the introduction of internal cost accounting. While the principle of the contractual distribution among the coperformers within the organization of the wage fund for the theme and the planned assets for the current payment of bonuses was implemented already in case of the first model of cost accounting.

One of the subdivisions of an organization, as a rule, the scientific division, concludes an external contract with a client. Its cost (price) is distributed on the basis of internal contracts among the coperformers. What does this provide? First, contract prices make it possible to determine more objectively the contribution of each coperformer to the common cause. Second, the likelihood of a "slip" when establishing external contract prices decreases sharply. Third, by having internal prices, each subdivision attributes its own material expenditures to its own cost of the work and forms its own revenue, while after the making of payments for its own fixed production capital and other obligatory payments it forms its own fund for the remuneration of labor.

In this situation it is necessary to know how to determine the optimum contract price, which enables the cop performer to exist and develop normally. This optimum can be easily found, having designated the planned fund for the remuneration of labor, having calculated the planned revenue in accordance with existing standards with allowance made for obligatory payments, and having added to it the anticipated material expenditures. The sum of the contract prices of the cop performers can serve as a basis for negotiations on the contract price for a development as a whole with an external consumer.

The **second**. The rejection of the concepts "wage" and "bonus" and the changeover to the concept "remuneration according to labor," or "earned payment."

The **third**. The introduction of the principle of the collective distribution of assets for the remuneration of the labor of all personnel, including managers, with complete glasnost. Here the assets of the fund for the remuneration of labor are placed practically entirely at the disposal of the labor collectives that earned them.

NTR: PROBLEM I RESHENIYA: The labor collectives determine independently the directions of the use of the fund for the remuneration of labor. But is there any certainty that they will do this wisely and fairly?

V. P. Zuyev: As of 1985 we introduced extensively the brigade form of the organization of labor, and the collectives divided independently the total additional earnings in the form of the wage fund and bonus. The collectives of the divisions distributed just as independently the bonus sum under the conditions of the first model of cost accounting; moreover, there was not even an hint of leveling. For example, according to the results of the work during the first quarter of 1988 the "spread" of the amount of the bonus for the same position came to 25 to 890 rubles.

NTR: PROBLEM I RESHENIYA: But why, then, are there salary schedules and wage rates?

V. P. Zuyev: For the present they are needed. The position and salary still determine to some extent the social importance of an individual.

NTR: PROBLEM I RESHENIYA: How independent are your subdivisions?

V. P. Zuyev: Not only the association as a whole, but also each structural unit operate under the conditions of a leasing contract. Internal cost accounting in case of leasing is necessary and logical. The traditional thorough specialization of subdivisions, in case of which a large amount of time was spent on mutual consultations and coordinations in the process of transferring a job from subdivision to subdivision, from scientists to designers, from designers to production, and so on, lengthened significantly the time of the conducting of development. That is why the substantial change of the structure of the institute, which was dictated by the changeover from the

serial arrangement of the occurrence of the cycle "scientific research—design—production of a prototype—tests—introduction" to a parallel-serial arrangement, was one of the basic steps when introducing internal cost accounting. **This led to the establishment of autonomous scientific production or scientific technical subdivisions, which for the most part are capable of independently developing and selling a scientific and technical product.** In such subdivisions designers, workers, and other specialists work together with scientists.

The subdivisions of the institute with the rights of leasing collectives can independently sell their product both to external clients and to subdivisions within the institute, paying in this case with the receipts from sale via the check system. The difference between the receipts from the sale of the scientific product both outside and within the organization and the material expenditures, including the leasing fee, is the revenue of the subdivision.

NTR: PROBLEM I RESHENIYA: Are the subdivisions also just as independent in the spending of what has been earned?

V. P. Zuyev: They have the right to spend independently a significant part of the received revenues, here the share of the revenue, which is channeled without fail into scientific, technical, and social development, is stipulated in the leasing contract. Only 23 percent of the revenues are centralized for the implementation of measures of scientific, technical, and social development of an institutewide nature.

All the fixed production capital, including production areas, is attached to the subdivisions, and, accordingly, the amortization deductions for its replacement have been completely transferred to them.

NTR: PROBLEM I RESHENIYA: Such a high level of independence of the subdivisions suggests an idea—Is the administration needed?

V. P. Zuyev: When introducing the leasing contract the question of the role of administrative and management personnel and of the outlays on their upkeep, including on the remuneration of labor, was one of the most urgent questions. The necessity of the reduction of administrative and management personnel is not disputed, but the only means of accomplishing this is the delegation of the functions of management to the lower levels of the management structure.

At the association they took this path. In particular, the questions of the distribution of the bulk of the fund for the remuneration of labor, planning, and, to a significant extent, the accounting of expenditures, the spending of the scientific and technical development fund, and the calculation of the wage, and a number of other questions were turned over to the leasing subdivisions.

Moreover, a number of traditionally management subdivisions (the division of material and technical supply

and the delivery of complete sets of equipment, the operation division, and so forth) were changed over to the leasing contract and contractual relations with the basic scientific production subdivisions.

As a result the size of the administrative management and nonproduction subdivisions was reduced to one-half.

NTR: PROBLEMY I RESHENIYA: How is your so carefully thought out system withstanding the "avalanche" of the state order?

V. P. Zuyev: For the present it is withstanding it. Although what is sent down from above—orders, limits, control figures, standards—is far from always interconnected. We receive orders, which are not backed by materials, it is not taken into account whether or not we have the means to fill the order and whether we have sufficient capacities and equipment.

Thus, on the one hand, the state order is liable to unconditional filling and, on the other, the collective is not always capable (even physically) of filling it. We believed, after all, that the state order would be the most profitable of all orders (throughout the world there is literally a fight for them). But now it is clear that the most problems of all are will the state order.

NTR: PROBLEMY I RESHENIYA: What is to be done so that it would become profitable for those who fill it?

V. P. Zuyev: The state order should be placed only on a competitive basis. For example, it is necessary to solve some problem for the country. For this 100 million rubles (hypothetically, of course) are being allocated. Who will undertake to solve it? No one. And for 150 million? That is, something like an auction should take place. A performer, who for a reasonable sum (undoubtedly, given such conditions there will be several candidates, which will also make it possible to determine the optimum sum for everyone) will solve this problem, will be found without fail. Of course, when placing a state order all the details should be immediately stipulated. Not only "to make such and such," but also in so doing "such and such is being allocated, such and such organizations are being involved." In the United States the project of the Apollo system was carried out in accordance with such an arrangement. There thousands of firms, which were interconnected by a network plan, were involved. And all were interested in the filling of the prestigious and profitable state order. That is also how it should be in our country.

NTR: PROBLEMY RESHENIYA: I Now about prices. The scientific and technical product is a special commodity. And the conditions of work on a lease are also special....

V. P. Zuyev: Here everything has been worked out. In the decree on the changeover of scientific organizations to full cost accounting it is clearly specified that the price for the scientific and technical product is a contract

price. Any attempts to regulate it by the establishment of the level of profitability or the introduction of procedural instructions on its formation according to some criteria automatically transfer the price for the scientific and technical product from the category of a "contract" price to the category of an "accounting" price. Only two parties—the client and the performer—should take part in determining the price. I believe that the client in this case should take into account mainly the impact from the future introduction of the scientific and technical product, which is expressed in the anticipated profit from introduction.

The performer when determining the price should take into account the expenditures on the development of the scientific and technical product, that is, its production cost and the maximum necessary level of profitability, which is sufficient for the implementation of the principles of self-financing, that is, which makes it possible to ensure the required scientific, technical, and economic development of the organization and to form incentive funds. The lower level of the contract price is governed by this. For the establishment of the upper level the performer should know how to estimate the anticipated profit, which the client will derive from the use of the scientific and technical product.

In case of the sale of the scientific and technical product, for example, in the form of documentation and a prototype, to an industrial enterprise for the organization of series production it is possible, based on the limit price and the planned production cost, as well as on the production volume, to specify the profit, which the industrial enterprise will derive, and, accordingly, the price of the scientific and technical product as a specific fraction of this profit. Of course, it is impossible to provide recommendations for all life events, and here the professionalism and competence of the representatives of scientific organizations and industrial enterprises, who are participating in the price negotiations, should come into play.

NTR: PROBLEMY RESHENIYA: I Vitaliy Pavlovich, I have already had occasion to be confronted repeatedly with the fact that cost accounting is at variance with the work of science for the future and with the most promising developments. For example, over 90 percent of the new technological developments of the Ukrainian SSR Academy of Sciences have not been introduced in production, which is grabbing up innovations. Will not cost accounting, and especially leasing in science, lead to a shift of scientific research and development in the direction of the making of a scientific and technical product for wealthy clients on the basis of the already achieved level?

V. P. Zuyev: The apprehensions are not unfounded. But this problem can be solved, and its solution is in the hands of the management of the scientific organization and the labor collective, provided, of course, that they understand that without exploratory work the activity of

the scientific organization does not have a future. And since they are on a lease, they understand.

The following solution was found at the Spektr Scientific Production Association. The Perspektiva Program, in which there was included exploratory work that is making it possible to create a scientific research for the next five-year plan, was formulated with the participation of leading scientists of the association. For the financing of the work on this program about 1.2 million rubles were allocated from the fund of scientific, technical, and social development of the association. A reserve of the fund for the remuneration of labor for the payment of bonuses to the participants in exploratory work and research is also envisaged.

NTR: PROBLEMY RESHENIYA: I In recent times people have been speaking more and more often about the sharp increase of the spending on the wage in science without appreciable results in the acceleration of scientific and technical progress. What is your opinion?

V. P. Zuyev: Having put the question that way, we are returning to the notorious planning and evaluation of the results of work from the achieved level. But the question should be about the conformity of the activity of the organization and every worker to the achieved results. And even if we approach the evaluation of the conformity according to the "base," it is necessary first of all to evaluate this base. For it is impossible to disregard the enormous leap in the development of the country, which has occurred during the years of Soviet power, especially if you consider the start from practically a feudal society and the immense hindering factors of development (the civil and patriotic wars, the decades of lawlessness and repressions, and so forth). And it is impossible not to note the decisive role in this development precisely of science.

Did the wages in science correspond to the contribution which it made to the development of the country? For in the 1940's the wage in science was 40 percent higher than in industry. Then the devaluation of scientific labor began, and in the early 1980's the average wage in science was even less than in industry. In 1988 for the first time in recent years, the wage in science was again higher than in industry, even by...5 percent. And thesis appeared: "science earns much and does nothing." But excuse me, science cannot and should not yield an immediate result!

Therefore, it is necessary to look closely at the "base" with allowance made for the experience of developed capitalist countries.

Breakdown of Fund of Scientific, Technical, and Social Development (thousands of rubles)

Fund of scientific, technical, and social development (total)	5688
Sources	
From revenue	4218
From amortization	1470
Uses	
At disposal of leasing collective	3856
Centralized for development of science and technology, retooling, and social development of general purpose	1832

Breakdown of Fund for Remuneration of Labor (thousands of rubles)

Total	7338
For remuneration of labor of personnel of leasing collectives	6518
For remuneration of labor of personnel of management and nonproduction subdivisions	390
Reserve	340
For incentives for winners of socialist competition	50
For provision of material assistance	40

Formation of Funds Under Leasing Contract in 1989 (millions of rubles)

Cost of sold scientific and technical product	26
Material expenditures	14.12
Including	
fund of scientific, technical, and social development from amortization	1.47
Leasing fee	0.32
Cost accounting revenue	11.56
Including	
fund for remuneration of labor	7.34
fund of scientific, technical, and social development from profit	4.22

NTR: PROBLEMY RESHENIYA: I And still you will agree that the remuneration of labor should correspond to the final results of labor. For under the conditions of leasing this is one of the basic principles.

V. P. Zuyev: Of course. But what is one to regard as the end result of the work of a scientific organization? For it is impossible to link today's remuneration of labor with the results of scientific activity, which, perhaps, will appear in a few years. What is one to do?

One of the means is the expert estimation of the future results of work and the assets for the remuneration of labor.

This is not the best means, since the estimate of even the most qualified experts is always fraught with an element of subjectivism, especially if you consider that specialists in the type of work being evaluated should act as the experts.

The version, in case of which the activity of a scientific organization or its structural subdivision is evaluated by a specific set of indicators, which reflect the end results during a specific planning period, and the remuneration of labor is made dependent on the achieved indicators, is more preferable.

NTR: PROBLEMY RESHENIYA: I But the indicators might be innumerable! There is, after all, a multitude of them!

V. P. Zuyev: Under the conditions of cost accounting two actually exist: the revenue (profit), which determines the amount of assets for the remuneration of labor after mandatory payments and the deduction of assets for the fund of scientific, technical, and social development, and the ratio between the growth rate of the payments from the fund for the remuneration of labor and the growth rate of the revenue. This is obviously insufficient, since in the absence of a free market of the scientific and technical product and a certain monopolism of scientific organizations the revenue does not always reflect the importance of scientific research and development. Although it should be noted that with the changeover of the entire national economy to full cost accounting and self-financing this negative factor should if not disappear, then weaken substantially. It will not disappear, apparently, as long as the budget financing of science is retained.

NTR: PROBLEMY RESHENIYA: I What is one to do? What does your experience suggest?

V. P. Zuyev: We developed a set of indicators, which make it possible, in our opinion, to evaluate the activity of a scientific organization and its subdivisions under the conditions of leasing relations. This set is now undergoing testing in collectives. Among the planned indicators, which are included in the leasing contracts, are:

- the gross revenue per worker;
- the volume of export deliveries of the scientific and technical product for currency of the first category as a percent of the total sales volume of this product;
- the average length of the cycle of the development of the scientific and technical production (the completely finished contract);
- the volume of output of the series-produced product in accordance with a development of the subdivision (per worker);
- the volume of output of consumer goods in accordance with a development of the subdivision (in rubles per ruble of the average wage);
- the volume of paid services rendered to the population per worker.

The numerical values of these indicators were calculated on the basis of the plans of work of the organization, and the cost accounting remuneration of the labor of staff members is regulated subject to their fulfillment.

NTR: PROBLEMY RESHENIYA: I And how is this done?

V. P. Zuyev: We are attempting to implement the provision on the contract hiring of scientific personnel, which is envisaged by the decree of the CPSU Central Committee and USSR Council of Ministers "On the Changeover of Scientific Organizations to Full Cost Accounting and Self-Financing," having extended it to all categories of personnel.

The amount of work on the list of official duties of personnel and the maximum amount of the wage, which a worker can receive for their fulfillment, are stipulated in the contract (labor agreement).

Here the maximum amount of the wage is determined on the basis of the planned fund for the remuneration of labor of the subdivision, in which the staff member works, with allowance made for the growth ratio.

This sum is formed of two parts—the fixed part (the salary, the wage rate) and the variable part (what is called "extra earnings").

In case of the fulfillment of some indicator, which is stipulated in the leasing contract, a specific portion of the extra earnings is credited to the staff member, in conformity with the statute on the cost accounting remuneration of labor. Thus, if all the indicators have been fulfilled, staff members receive the maximum contract wage.

Taking into account the importance of the expansion of the export of products in the development of the country (inasmuch as today, in our opinion, this is a decisive criterion of the technical level), in case of the fulfillment of the volume of export deliveries for freely convertible currency the cost accounting remuneration of labor can be greater than the remuneration stipulated in the contract, but is within the amounts for the remuneration of labor, which have been obtained from the sale of export products.

NTR: PROBLEMY RESHENIYA: I The improvement of the economic mechanism, the introduction of various models of cost accounting and leasing—all this is aimed at the elimination of leveling and lies within the sphere of distribution. How effectively are the stimuli, which are being developed here, influencing the sphere of production?

V. P. Zuyev: The dependence of the remuneration of labor on the end result made it incumbent to shorten the time of the completion of jobs.

The share of the material expenditures in the cost of a development has been reduced significantly. In 1988 it came to 50 percent of the cost of the job, while in 1987 it came to 70 percent.

As compared with 1987, in 1988 the sales volume of scientific and technical products increased by 75.8 percent and came to 22.7 million rubles. The number of workers was reduced by 2.1 percent. The output of sold scientific and technical products increased from 8,084 rubles to 14,615 rubles, that is, by 80.7 percent. The capital-labor ratio per worker came to 12,690 rubles.

During the first quarter of 1989 (3 months of work under the conditions of leasing) as compared with the same period of 1988 the sales volume of scientific and technical products increased by 2.2-fold, the ratio of the growth rate of the fund for the remuneration of labor and the growth rate of revenue came to 0.937 with an established standard of 0.98. The number of completely finished economic contracts increased by twofold, moreover, their cost decreased from 75,600 rubles to 60,000 rubles.

NTR: PROBLEMY RESHENIYA: I Is the introduction of this ratio very hindering?

V. P. Zuyev: The main trouble is that the standard is holding back the work of an exploratory nature and retooling, which we are performing at the expense of our own fund of scientific, technical, and social development: payment for them is not backed by revenues, because this work cannot be included as receipts from the sale of products.

NTR: PROBLEMY RESHENIYA: I What problem is most urgent today for you—for lessees?

V. P. Zuyev: In general there are quite a number of them. But the primary one is the creation of such conditions, which will force the lessee to become the real owner of the leased property.

Government Laws, Policies Impede S&T Progress

18140315b Moscow NTR: PROBLEMY I RESHENIYA in Russian No 13 (100), 14 Jul 89 p 5

[Article by A. Mikhaylov under the rubric "The Problem": "By What Laws Do we Live? Is the 'Free Competition' of Forms of Ownership Possible?"]

[Text] At the end of June the decree of the Congress of USSR People's Deputies "On the Basic Directions of USSR Domestic and Foreign Policy" was published. We will not touch upon the entire content of this political document, but will confine ourselves to the discussion of only that part of it, which to one degree or another concerns the problems of science and technology. Let us

quote one of the provisions of the decree: "When accomplishing strategic tasks of the development of the economy, basic attention should be devoted to the radical reequipping of production on the basis of the latest achievements of domestic and world science and the introduction of advanced technologies, first of all electronics, information science, and biotechnology."

Alas, familiar words, which, like an incantation, for more than just 1 year now have been uttered at all management levels. Advanced technologies.... In front of me there are four volumes of developments of the Siberian Department of the USSR Academy of Sciences, which it is proposing for extensive introduction in the national economy. Here is one of them. The Institute of Chemistry of the Siberian Department of the USSR Academy of Sciences developed multilayer film electrophotographic information-carrying media for computer printers. The need for them back in 1985 came to 1 million square meters. The development of the Siberian scientists does not have analogs in the USSR, is not inferior to and, with respect to several indicators, surpasses the best foreign analogs, and is protected by inventor's certificates. The use of such information media in printers of just one type in place of imported ones will make it possible to derive an economic impact of 24 million rubles.

Do you think that interested ministries (and in this case these are the USSR Ministry of the Radio Industry and the USSR Ministry of the Chemical Industry) "extorted" the innovation from scientists? You are mistaken, they did not lift a finger. While the researchers, who know how they treat a new thing in ministries, are merely asking humbly that a joint cost accounting venture be established on the basis of their institute.

Biotechnology.... We saw enough of its shame at the current session of the USSR Supreme Soviet, when the candidacy of the minister of the medical industry was approved. The prime minister himself was forced to acknowledge the fallaciousness of the strategic direction of the work of this ministry—the aspiration to increase the output of microbiological fodder protein to 2 million tons a year—and to say: "The solution here lies in the sharp increase of the production of vegetable protein. This is that path that the entire world is taking today." But what about us, did we find out about this only at the present session of the organ of our supreme power?

A phrase from the decree of the Congress: when formulating the next five-year plan to devote particular attention to "questions of resource conservation." A year ago a very fat volume, 300 pages long, which was simply entitled "Progresivnyye resursoberegayushchiye tekhnologii, razrabotannyye Akademiyey nauk USSR" [Advanced Resource-Saving Technologies Developed by the Ukrainian SSR Academy of Sciences], was published in Kiev. The proposals of Ukrainian scientists provide in their aggregate an economic impact of tens and tens of millions of rubles. But, of course, provided they are introduced extensively. But now, dear reader, quite

frankly, you will say: "Are you certain that extensive introduction will become a reality?" I am not certain.

I believe that each of us would subscribe to the following lines from the decree of the Congress: "to create equal conditions for the development and free competition of ownership: statewide ownership, local (communal) ownership, cooperative ownership, ownership based on leasing and sharing principles (the joint stock form), ownership based on individual labor activity, as well as mixed forms of various types."

Let us see how this "competition" takes place, for example, between the state and cooperative forms of ownership.

On 4 May of this year a decree of the USSR Council of Ministers, in which state enterprises, which had concluded contracts with cooperatives for the performance of jobs and services, were ordered to reduce their wage fund "by the amount of the expenditures on the remuneration of labor, which are envisaged for the performance of these jobs and rendered services," was adopted. This was a mighty blow to cooperatives, especially scientific technical cooperatives, since in nature enterprises, which would release their wage fund "on the side," simply do not exist. But, as they say, forget about it, about this decree. It was adopted before the Congress of People's Deputies and, besides, is evaded surprisingly easily: it is sufficient for the cooperative member to come to an agreement in advance with the enterprise about the future work, without concluding any contract, and then simply to sell his product at contract prices.

But then a month later, on 6 June—the Congress of People's Deputies had already become a reality—the Presidium of the RSFSR Supreme Soviet adopted an ukase on the taxation of cooperatives. Here is how USSR People's Deputy N. Travkin appraises it: "...the ukase imposes on cooperatives taxes in the amount of 25-60 percent of the revenue. For construction cooperatives, for example, a tax of 25 percent of the revenue is all 100 percent of the profit. Who will work on such terms? And who will gain from the fact that these cooperatives will disintegrate? By putting this ukase into effect, we are cutting off cooperation. And first of all production cooperation, which is most needed and promising." And—let us add on our part—this ukase also strikes the same fatal blow to the majority of scientific technical cooperatives.

Believe after this the appeals for "the free competition of the forms of ownership"!

But a month has already passed since the day of the adoption of this ukase, the authors of which, being on fixed salaries in the luxurious building of the Presidium of the RSFSR Supreme Soviet, apparently forgot the difference between "revenue" and "profit." Meanwhile the subtle minds of civilized cooperative members also found a way out of this desperate situation. It turns out that it is possible to dissolve the cooperative, and then to

register it again, but now...in one of the Baltic republics—there the taxes are substantially lower. There is also another method to "skirt" the ukase: to establish diversified cooperatives with the indispensable rendering of medical services (sick-nurses, visiting nurses, and so on)—here the tax does not exceed 3 percent. But, it seems, it is necessary to be a very naive person to believe in the legal honesty of such actions: the transformations of cooperatives hardly manage without substantial "gifts of thanks."

And in conclusion there is the following. We all followed with enormous interest the Congress of USSR People's Deputies and read its final document with pencil in hand. But it turns out that "the harsh prose of life" is always far from the principles that our people's deputies have declared. There are excellent political statements and magnificent scientific and technical proposals, but life all the same flows along in accordance with completely different laws. What is behind them?

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18140330 Moscow *TEKHNIKA I NAUKA* in Russian
No 6, Jun 89 pp 46-47

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The form of scientific and technical cooperation is by understanding.

For information call: 31-45-81, 31-40-61, 25-81-19.

Address of the board: 300600, Tula, Ulitsa Mendeleevskaya, 1, the Board of the Oblast Organization of the USSR Union of Scientific and Engineering Societies. [Passage omitted]

Data Bank

The Bank of Technical Ideas has been set up and is operating at the Ukrorglestehtmontazh Association. Engineering solutions with respect to a number of important questions of the timber industry, which it is also possible to use in other sectors of the national economy, have been accumulated in it. The bank is prepared to enter into business contacts on the purchase and sale of ideas and developments at contract prices.

We offer the following Developments:

Microprocessor Engineering

1. The development of technical specifications and software and the start-up and adjustment of microprocessor systems of control of technological processors in the wood working industry. The cost of development is according to contract.
2. The development, execution, and installation of microprocessor circuits on imported automatic lines on the basis of domestic microprocessors. The cost of design work is according to contract.
3. The repair and adjustment of existing microprocessor systems.

Address inquiries to: 252004, Kiev-4, Pushkinskaya, 21-a, the Ukrorglestehtmontazh PTMYeO.

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GKNT Announces Materials Technology Competition

18140318a Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 5 Aug 89 p 2

[Article under the rubric "Attention: A Competition!":
"Promising Materials"]

[Text] The USSR State Committee for Science and Technology, the Scientific Council for the State Scientific and Technical Program (GNTP) "Promising Materials," and the Soviet Association "Promising Materials" announce the competition of projects for the development of new competitive construction and functional materials and high-performance technological processes of their production.

Collectives of associations, enterprises, and institutes, any creative collectives, scientific and technical cooperatives, individual specialists, and citizens of the USSR and other CEMA member countries are invited to participate in it.

It is possible to familiarize oneself with the statute on the competition and the themes of competitive projects at the offices of the scientific secretaries of the Scientific Council for the priority directions of the State Scientific and Technical Program "Promising Materials," which are listed below:

- metallic materials (117911, GSP-1, Moscow, Leninskiy prospekt, 49. Telephone numbers for inquiries: 135-94-83, 135-32-15, 265-72-85);
- ceramic materials (252180, GSP, Kiev, Ulitsa Krzhizhanovskogo, 3. Telephone number: 444-20-24);
- composites (107005, Moscow, Ulitsa Radio, 17. Telephone numbers: 267-01-03, extension 25-83, 135-87-21);
- glass materials (199034, Leningrad, Naberezhnaya Makarova, 2. Telephone numbers: 350-05-94 (Leningrad), 258-95-81 (Moscow));
- ultrapure substances and materials (603600, GSP-445, Gorkiy, Ulitsa Tropinina, 49. Telephone numbers: 66-85-42 (Gorkiy), 234-43-10 (Moscow));
- permanent joints and coatings of new construction materials (252650, GSP, Kiev-5, Ulitsa Bozhenko, 11. Telephone numbers: 220-91-26, 227-12-83);
- demands on the quality of new materials (193167, Leningrad. Telephone number: 274-17-24).

The materials with the note "Competition of the State Scientific and Technical Program 'Promising Materials'" should be sent to the address of the secretary of the section of the Scientific Council for the corresponding priority direction by 15 September 1989.

The results of the competition will be summarized by 15 November 1989. The projects of the winners of the competition will receive state financial support for the conducting of scientific research and experimental design work starting in 1990.

Reviews on the competition materials are not issued; the projects are not returned to the authors.

GKNT Announces Computer, Automation Technology Competition

18140318b Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 13 Aug 89 p 2

[Article under the rubric: "Restructuring: Practice and Problems": "The Prospects of Informatization. Attention: A Competition!"]

[Text] The USSR State Committee for Science and Technology, the USSR State Committee for Computer Technology and Information Science, and the USSR Academy of Sciences announce the next competition on the formulation of the state scientific and technical program (GNTP) "Promising Information Technologies" in the following directions of work:

- superhigh-performance computers based on new architectures and physical principles;
- ultrahigh-capacity external computer storages based on the use of new technologies and physical principles;
- artificial intelligence systems, including professionally oriented complexes and networks of data and knowledge bases and banks;
- integrated information transmission systems based on advanced means of communication, including lightguide lines and high-definition television;
- systems models for the evaluation and forecasting of large-scale socioeconomic and technical projects.

Projects of scientific research work on the development of fundamentally new equipment and technology and on the solution of major scientific and technical problems, which are of revolutionizing importance in the area of domestic computer technology and information science and contribute to bringing it up to the highest world level, can be submitted for the competition.

The projects, which are submitted for the competition, should envisage the completion of the full set of scientific and technical measures, which ensure the achievement of the specific ultimate goals in the most efficient ways.

Associations, enterprises, scientific research, design, planning, and technological organizations, higher and secondary educational institutions, and creative collectives can participate in the competition.

A project, in which the goals of the work, the fundamental novelty of the scientific and technical solutions, the schedule of the implementation of the project, the head organization, and the name of the supervisor of the project are indicated, is submitted for the competition. A brief description of the existing situation in the given field in the world, the reserve that the performers have, the specific content of the work and the anticipated results (by stages), which have been formulated in a form which makes it possible to monitor their achievement,

and the amounts of financing from all sources (separately) are also cited in the proposal. The proposal should be submitted for approval to the client as a guarantee of subsequent industrial introduction. In the proposal it is desirable to indicate the technical and economic substantiation, the scientific and technical level at the moment of completion of the work, and the approximate needs for the results of this work in the USSR and abroad.

The projects, which have undergone competitive selection, receive a state budget subsidy from the assets of the USSR State Committee for Science and Technology in addition to the assets of the client and the assets of their

own and the departmental centralized funds of the financing of scientific research work.

Completely drawn up proposals are submitted to the secretariat of the scientific council for the state scientific and technical program "Promising Information Technologies" at the address: 125219, Moscow, Baltiyskaya, 14, the All-Union Institute of Scientific and Technical Information.

Proposals are accepted until 31 August of this year, the results are tallied before 1 November of this year.

Additional information is available at the telephone numbers: 155-43-07 and 151-07-12.